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Original Contributions.

ADVANCE AND RETROGRESSIVE EVOLUTION.

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Every living being is exposed to forces which act on its organism so as to produce three results—to keep it in statu quo; to increase the complexity of its structure, or to diminish the complexity of its structure. Every living being has before it three possibilities: statu quo, elaboration or advance evolution, and degeneration or retrogressive evolution. Underlying these are various phases of environment which depend upon the supply of nutriment to be assimilated and the power of assimilation. Degeneracy or retrogressive evolution may be defined as a gradual change of structure whereby the cell structure of the organ or organism becomes adapted to less varied and complex conditions of life. Elaboration or advance evolution is a change of structure whereby the cell structure of the organ or organism becomes adapted to more and more varied and complex conditions of existence. In degeneracy there is suppression of form corresponding to cessation of work. The organism is in a system of balance whereby the benefit of the whole is secured. The amount of nutriment and assimilation being fixed, a struggle for existence occurs between different cells, structures and organs. Under physiologic balance, specialization restricting function lessens the nutriment needed for a given organ or cell. Through this specialization cells surrender their reproductive powers for the benefit of the organism as a whole. Specialization is an expression of advance, while generalization is an expression of degeneracy, which hence becomes necessary in a part for the benefit of the body as a whole.

The organism as subjected to environment is the product of four factors—direct heredity from the immediate ancestors; immediate and remote atavism. Remote atavism usually favors degen-

cracy of the organism as a whole. Immediate atavism and type heredity therefore often combine against direct heredity and remote atavism. Direct heredity tending to retrogressive evolution occurs through general weakness, manifested along the lines of least resistance. Neurasthenia of certain organs in the parents often causes organ instability in the offspring, whereby lower structures and functions gain at the expense of the higher. The contest for existence along the structures as manifested by the various organs, even when for the benefit of the organism as a whole, has varied greatly during the course of zoologic development.

The face's contest for existence with the brain has frequently

FIG. 1.

caused cranium and jaws to assume for defense and food purposes a lower type. The face (a characteristic of the higher vertebrates) acquires increased importance with rise in the zoologic scale. The position of the face in embryonic development was originally determined by the head bend. If a median longitudinal section of the head occupies a triangular area divided into quarters the lower posterior quarter corresponds to the mouth region and the other three-quarters to the brain. As development progresses the mouth quarter enlarges so disproportionately in relation to the rest of the head as to project forward in front of the forebrain. In this stage, which is represented by adult amphibians, the facial apparatus is very large proportionately to the cranium. In reptiles the mouth region is elongated still further in front of the brain

case, resulting in the long snout. In mammals a third stage is established by the great increase in size of the forebrain, and in consequence the brain extends over the snout. In man, whose brain has the maximum enlargement, the facial apparatus is almost entirely covered by the brain. During zoologic evolution the face, while serviceable to the animal for certain reasons of general constitutional character (food-getting, means of defense,

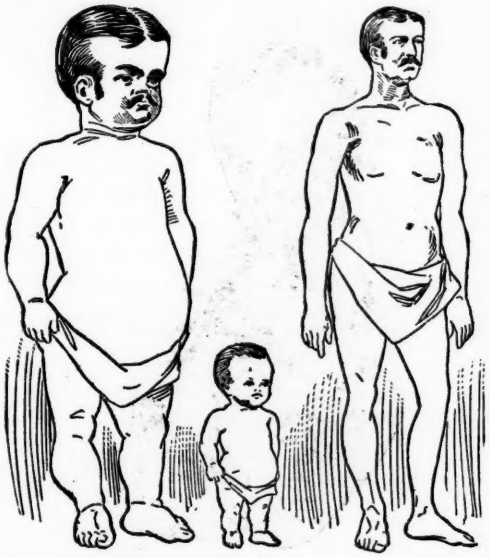

FIG. 2.

and obtaining mates), is less so than brain growth. A struggle for existence therefore inevitably results between the tendency of the face to appropriate power of growth and the like tendency of the brain, which in defective organisms produces marked degeneracy of the one for the benefit of the other. This struggle is further complicated by the embryonic relations to both of the hypophysis, since this body admittedly exerts an influence over bony growth, most markedly (but abnormally) exhibited in acromegaly (excessive bone growth). In this contest for existence degeneracy necessarily takes the direction of least resist-

ance. The brain is the last acquirement in vertebrates, considered from the standpoint of necessity, while the face (also a late acquirement) is much less complex. The latter will therefore present degeneration in shape while the former exhibits it in shape and function. Furthermore, during the embryonic period brain development of necessity is more immediately affected by degeneracy than the face, which gains in evolution at its expense. Degeneracy stigmata most likely to attract attention are hence in

FIG. 3.

the order given—those of the face, jaws and teeth, ears, eyes, cranium, body, bodily functions, brain and spinal cord. With increased power of securing and assimilating food disuse of the teeth and jaws results, as fewer and smaller teeth are needed and less jaw. If the jaw yields most, less room for the teeth is present and irregularities of one type result. The reverse conditions exert similar influences.

Conditions which modify healthy development are, as I have elsewhere shown, ordinary and consanguineous marriages, inter-

mixture of races, climate, soil, food, etc. These, however, do not produce such marked arrests and excessive development as are caused by an unstable nervous system in the parent as well as in the child. The unstable nervous system of the parent, which produces arrests in the child, is often due to excesses in toxic

FIG. 4.

agents. These are divisible into those belonging to the condiments, medicines, foods and beverages; those arising from occupation, and the autotoxemias. Tobacco, alcohol, opium, tea, coffee, cocain, as well as lead, mercury and brass, produce toxic effects. Excesses in a social way, late hours, etc., may produce profound systemic nervous exhaustion with autotoxemia in the ancestor and especially the ancestress, likely to be transmitted as degeneracy to the descendant. The acute and chronic contagions

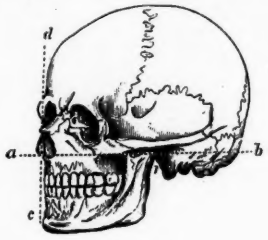

FIG. 5.

and infections of the parent, especially the mother, exert the same toxic influences upon the fetus, impoverishing it and checking healthy nutrition.

The factors producing degeneration in the child often arise from nervous exhaustion in the first generation, which implies a practical degeneration in function, since tone is lost. Every nerve cell has two functions, one connected with sensation and the other with growth. If the cell be tired by excessive work along the

line of sensation or motion the function as regards growth becomes later impaired, and it not only ceases to continue in strength, but becomes self-poisoned. Each of the organs (heart, liver, kidneys, etc.) has its own system of nerves (the sympathetic ganglia),

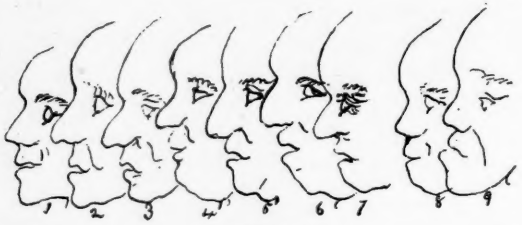

FIG. 6.

which while under control by the spinal cord and brain act independently. If these nerves become tired the organ fails to perform its function, the general system becomes both poisoned and ill-fed, and nervous exhaustion results. In most cases, however, the brain and spinal cord are first exhausted. The nerves of the

FIG. 7.

organs are thus allowed too free play and exhaust themselves later. This systemic exhaustion has local expression in the testicles in the male, in the womb and ovaries in the female. Because of it the body is imperfectly supplied with natural tonics (antitoxins) formed by the structures, and the general nervous exhaustion becomes still more complete. All the organs of the body are

weakened in their function. Practically the neurasthenic, as regards his organs, has taken on a degenerative function, albeit not degenerating in structure, since the restlessness of the organs is a return to the undue expenditure of force, which occurs in the lower animals in proportion as it is unchecked by a central nervous system. Through the influence of various exhausting agencies the spinal cord and brain lose the gains of evolution, and the neurasthenic is no longer adjusted to environment. Since the reproductive organs suffer particularly, children born after the acquirement of nervous exhaustion, more or less checked in development as the influence of atavism is healthy or not, repeat

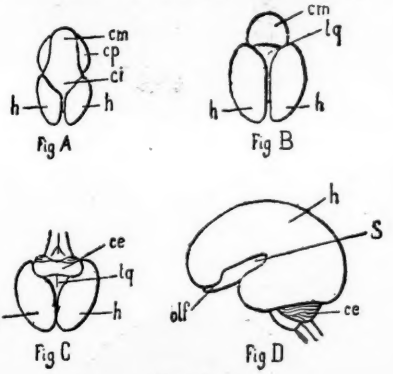

FIG. 8.

A, Brain of a human embryo of seven weeks; *h*, cerebral hemispheres; *ci*, intermediate brain or thalamencephalon; *c·n*, mid-brain; *cp*, hind-brain. *B*, brain of a human embryo about the beginning of the third month: *h*, cerebral hemispheres; *tq*, region of the corpora quadrigemina; *cm*, mid-brain. *C*, Brain of a human embryo at the middle of the third month; *h*, cerebral hemispheres; *tq*, corpora quadrigemina; *ce*, cerebellum. *D*, Human brain of the fifth embryonic month; *h*, cerebral hemispheres; *olf*, olfactory lobes; *S*, fissure of Sylvius; *ce*, cerebellum. (After Minalkovics, *Entwickelungsgeschichte des Gehirns.* Leipzig, 1877.)

degenerations in the structure of their organs, which in the parent were represented by neurasthenic disorders of function. As the ovaries of neurasthenic women are markedly affected by nervous exhaustion, the offspring of these do not retain enough vigor to pass through the normal process of development.

Maternal environment exercises an enormous influence on embryonic development in the direction of retrogressive evolution. Maternal shock produces arrests of development which are not photographic conditions, but survivals of embryonic states. While

maternal impressions do have an effect, it is simply in conditions of arrest and not in photographic reproductions of the alleged cause of the impression. In intrauterine life periods of stress occur around which, as Kiernan remarks, the disappearing and

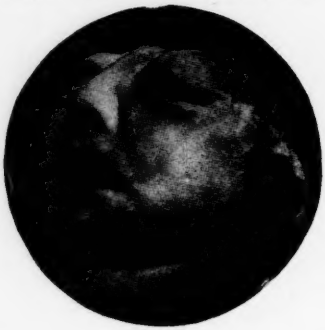

FIG. 9.

developing tendency of organs necessarily centers. At these periods certain functions and structures are to be lost by the disappearing and others gained by the developing organs; maternal shock checks proper progress at these periods.

When systemic balance, the result of evolution, is disturbed by

FIG. 10.

change in environment the organs, as has been shown experimentally by Jacques Loeb (Untersuch zur Physiol. Morphologie), do not pursue their usual growth. Such disturbances are peculiarly apt to occur during periods of stress because of the then varying relations of different organs. Struggles for existence on

the part of the different organs and systems of the body are hence most ardent during the periods of intra and extrauterine evolution and involution. During the first dentition, during the second dentition (often as late as the thirteenth year), during puberty and adolescence (fourteen to twenty-five), during the climacteric (forty to sixty), when uterine involution occurs in woman and prostatic involution in man, and finally during senility (sixty and upward), mental and physical defects may, as I have elsewhere shown (Degeneracy, Its Signs, Causes and Results), be evinced in

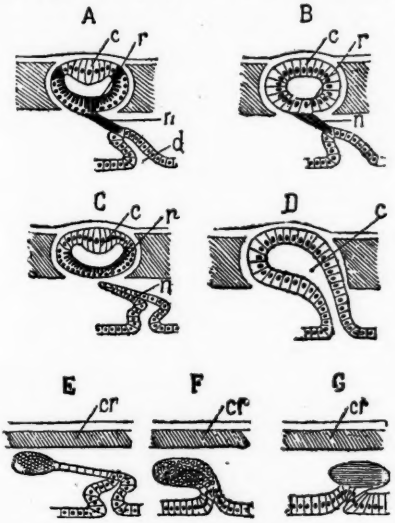

FIG. 11.

Diagram indicating the progressive evolution and the degeneration of the pineal eye.

A. Perfect pineal eye, as found in the slow-worm before birth, or in the adult Sphenodon (Hatteria); *c*, lens; *r*, retina; *n*, optic nerve; diverticulum of the thalamencephalon. B. Pineal eye in first stage of degeneration as it exists in *Chamoeleo* and as it was in the slow-worm before stage A. The lens (*c*), and the retina (*r*), are not differentiated. C. Pineal eye in the degenerate form found in *Calotes* and *Leiodera*; *c*, lens; *r*, retina; *n*, optic nerve in fatty degeneratoin. D. Very degenerate pineal eye as in *Cyclodus* and like the earliest stage in the slow-worm; there is no differentiation of the diverticulum from the thalamencephalon. E, F, G. Other modes of degeneration of the pineal eye. The eye lies within the skull and there is no parietal foramen; *cr*, cranial membranes; E, *Ceratophora*. F, birds; G, mammals. (After Baldwin Spencer.)

a congenital tendency which has remained latent until the period of stress.

The first period of stress is the most important so far as the

head, face, jaws and teeth are concerned. It is called the senile or simian period and occurs at four and one-half months of fetal life. The influence of neurasthenia in the parent may result in a bony arrest of development, shown to occur in animals by Charrin and Gley and in man by Coolidge. The facial bones, jaws and teeth are peculiarly liable to be thus affected. Though the effect of disease on the parent be but temporary, the child's development may be checked as to higher tendencies.

The factors entering into the struggle for existence most markedly involve the relations of the brain to the head and face. During intrauterine life the face loses and the brain gains. During the

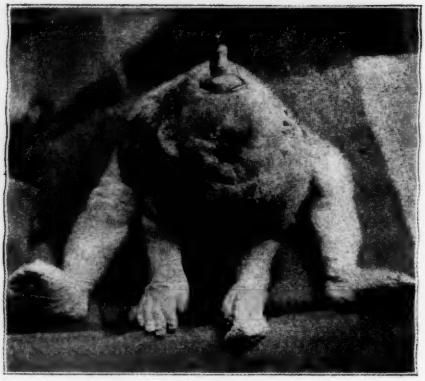

FIG. 12.

first extrauterine period of stress, between birth and three months, the brain is one-fifth the weight of the body, while in the adult it is but one-thirty-third. During the first six months the brain doubles in weight. The effect of stress during this period would, under the law of economy of growth, be felt either in diminution of the quality or quantity of the brain, or in the preservation of these at the expense of more transitory structures like the face, nose, jaws and teeth. This is well illustrated in the contrasted skulls (Figure 1). After birth the face gains at the expense of the brain, and the body and face as a whole so gain on the growth of the brain that, as Havelock Ellis remarks, further growth from the third year onward, though an absolutely necessary adaptation

to environment, is to some extent growth in degeneration and senility. The loss of child potentialities is well shown in Figure 2 (after Ellis), where the perfectly developed being fulfilling the promise of the child is contrasted with the man that the child actually becomes.

FIG. 13.

At the periods of sex-differentiation, and the simian or senile period (Figure 3), irregular balance given the struggle for existence leads to imperfect sex-differentiation or premature senility. This last often produces irregular and incomplete ossification.

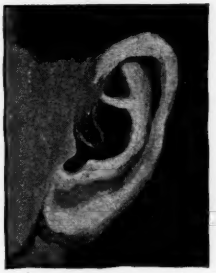

FIG. 14.

Since, as Harriet Alexander has shown, degeneracy is a process of evolution leading to alteration of form because of cessation of inhibition in certain directions resultant on diminished work, it logically follows that since diminished function precedes change of structure, increased function checks the change of structure in its biochemic stage. Nay, more, structural elaboration due to

gains from degeneracy may be retained while degenerate structures resume their higher functions. Hence a degenerate race under more favorable environment may rank higher in evolution because of the beneficial variations due to degeneracy. The structures of the face in man are degenerate as viewed from the vertebrate type, and very early in evolution have been sacrificed to the gains of the central nervous system (Figure 2). Therefore struggles for existence between organs leave decided marks on them. The jaws and face are less marked in type with rise in evolution.

In the evolution of man from the cell he passes through all adult stages of lower vertebrates—fish and reptiles to birds and mammals. Retrogressive changes in a general way are most markedly illus-

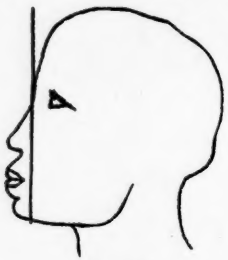

FIG. 15.

trated in plural births; here we have an atavism or return to the lower vertebrate type. Another marked retrogressive change is that in which the heart develops upon the right side—a return to the bird type. Still another is that in which the hands develop short of their normal position. There may be arrest of the bones of the arm and the hand may be given off at the elbow or shoulder. The same is true of the feet, which may become abnormally developed or given off at the knee or the hip. These are reversions to the flippers of the seal. Children "toeing in" is a return to the pre-shoe type. Shallowness of the acetabulum in children represents a type as high as the anthropoid apes.

Aristotle, 384 B. C., viewed the relations of the structures and organs to each other from the standpoint of a hypothetic law of economy of growth by which structures were sacrificed as entities to benefit the organism as a whole. Goethe in 1809 and St. Hilaire

in 1818 still further cleared this law of obscurity. Study of this revealed a struggle for existence between organs, with interaction consequent on use and disuse of structures. Camper employed this law in his use of the ideal face of the Apollo Belvidere to illustrate the gradual retreat of the jaws from lower to higher types of face (Figure 4).

The retrogressive phase of evolution, with which Camper did not deal, underlies all pathology of the face, as well as of the nose, jaws, alveolar process and teeth. The illustrations, supplementing those of Camper, portray this reverse phase where symmetry of the body as a whole is sacrificed to changes in the nose, jaws, alveolar processes and teeth so as to preserve brain gains. The facial angle

FIG. 16.

of Camper extended down below the chin, and Figure 5 represents the ideal face as portrayed by him. This illustration shows where anatomic progress ceases and the pathologic begins.

The next illustration (Figure 6), taken from photographs of patients, accurately portrays arrests of the face for the benefit of the brain. The gradual recession of the face and the forward development of the brain is a continuation of the condition shown in Figure 4 in the line of evolution. Nos. 8 and 9, Figure 6, show a return of the jaws to the lower negro type.

From the relations of this face degeneration nearly all the deformities and pathologic conditions of the head, face, nose, jaws, alveolar processes and teeth result.

One of the most common and interesting retrogressive or atavistic

developments is that including the entire head and face. The forehead recedes from the perpendicular line and the jaws protrude beyond the line. Figure 7 illustrates a Russian harlot. This type of head and face may become arrested at any period and the appearance may be that of the negro or anthropoid ape. The brain is as a rule undeveloped, taking the form of the fish, reptile, mammal, or the fetal forms of the human brain, as illustrated in Figure 8, and the individual may possess any one or all of the ethic, psychic or other degenerate qualities.

The primary skull is an extension of the vertebræ which send side outgrowths to cover the brain, as the backbone covers the spinal cord. In the lancelet it gives off two trabeculæ cranii or

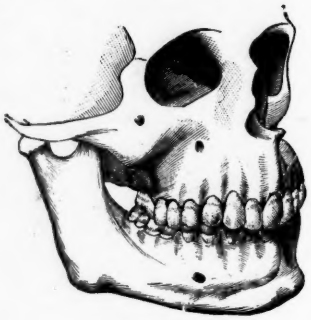

FIG. 17.

front skull plates. In back the primary skull (or chondrocranium) gives off two occipital or rear skull plates and two plates midway between the trabeculæ and the occipital. These gradually close the primitive hearing apparatus, the otocysts (permanent in fish and embryonic in man), and are called periotic capsules. This primary skull is at first cartilaginous, as in sharks. With the increase in the size of the brain in biologic evolution and in human embryogeny the cartilaginous primary skull becomes insufficient to roof over the brain and gaps result. The extent of these depends upon the amount of nutriment furnished by the mother for the development of the fetus. If sufficient material is not furnished fontanelles and open spaces in the skull result. Often these spaces are filled with Wormian bones. Again, the amount of nutrition may be so scanty that the entire dome of the skull remains undeveloped, as observed

in certain monstrosities (Figure 9), which revert toward primitive vertebrates and prevertebrates.

One marked retrogressive change is excessive development of the orbits, a reversion to the lemurian type which admits of a large range of eyeball movement in watching for danger (Figure 10). The remote ancestors of the vertebrates—the ascidian, the amphioxus, the slow worm and many lizards—possessed a median unpaired eye (Figure 11), which was subsequently replaced in function by the evolution of the paired eyes. The cyclopic condition occurs among human monstrosities (Figure 12) much more frequently than among animals, Hannover claims (Sajous' Annual,

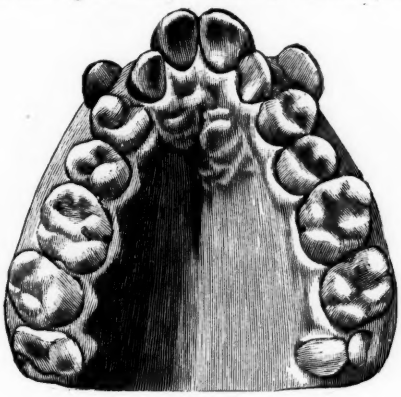

FIG. 18.

1889), but this is clearly due to the fact that human monstrosities are much more frequently recorded. Of the 120 cases I have been able to collect from literature, 56 presented other evidence of degeneracy than cyclopic conditions, and 60 had neuropathic or other defects in the ancestry. As Dareste has shown (Sajous' Annual, Vol. LV, 1892), production of a single eye, changes in the structure of the mouth, atrophy and abnormal situation of the olfactory apparatus and of the vesicle of the hemispheres, result from arrest of development and its determining influence must be exerted very early in embryogeny. This condition was discussed in a paper on Evolution of the Central Nervous System, which appeared in the DENTAL DIGEST for March, 1905, page 221.

The external ear is of all organs that most affected by degeneracy.

It is a cartilaginous organ extending from a bony base, without a bony framework for its support, and with very deficient blood supply, on account of its distance from the great blood centers, so that any defect in the nerve centers which control the local blood supply is likely to affect its nutrition. As a cartilaginous organ it has no lymphatics, which of necessity affects its growth. The sensitiveness of the ear to vasomotor changes is evidenced by the results of the extremes in heat and cold, emotional blushing and fatigue. To appreciate the retrogressive evolution observed in the ear, its embryology must be studied. I cannot enter into this discussion for want of space, so the reader is referred to Minot's Embryology.

FIG. 19

It is sufficient here to say that the ear is developed from six little buds, each having its own vasomotor system. Should the nervous system become unstable, one or all of these little points of development may become arrested—the result of which is that the external ear may not develop. One or six little protuberances may develop on the side of the head, the ear may be round, elephantine in character (Figure 13), or it may develop long and pointed (satanic) like the ear of the lower vertebrates (Figure 14), which Hawthorne gives Donatello in the Marble Faun.

In jaw evolution from an unbalanced nervous system one or both may take on a lower negro type, while the brain retains its later development. Figure 15 shows marked arrest of the face with protrusion of both jaws. Figure 16 shows marked arrest of the

face with excessive protrusion of the lower jaw. Again, in Figure 17 may be seen arrest of the face and lower jaw and excessive development of the upper jaw. A struggle is here going on between advance and retrogressive evolution.

The most interesting of all the retrogressive changes along the line of degeneracy in the human is that of change in shape of the jaw in the development of the teeth. Given an arrested upper jaw, the teeth erupt as best they can, just as a game of checkers or chess will terminate according to the first few moves upon the board. The character of the shape of the dental arch will depend upon which teeth are first developed, the cuspids or bicuspids. If the bicuspids develop first the break in the arch will occur at the weakest part, the anterior part of the mouth, and a V-shaped arch will be produced (Figure 18), a return to the reptilian type of jaw. If the cuspids develop first the break will be in the bicuspid region, which now becomes the weakest part, and a saddle arch will form (Figure 19), a return to the type of carnivora. All the other deformities are modifications of these two types, and in the mechanism of tooth eruption no other systems or shapes are possible. The jaws, traveling along the path of degeneration, return to their ancestral type—the vault of the mouth becomes low, the alveolar process short and thick, the roots of the teeth short and spread far apart.

(To be concluded.)

FUTURE OF PORCELAIN AS A FILLING MATERIAL.

BY F. E. ROACH, D.D.S., CHICAGO. READ BEFORE THE NORTHERN INDIANA DENTAL SOCIETY, AT HUNTINGTON, OCTOBER 18-19, 1904.

Before looking into the future and making any predictions as to the possibilities of porcelain, let us look back a few years and see what progress we have made in this particular department of our work. That we have made progress no one will question; that we are still progressing no one will dispute, and that there is yet room for improvement you will all agree. While our advancement seems to have been slow, a comparison of our present methods with those of ten or fifteen years ago shows wonderful improvement.

The pioneers in this field, as in all pioneer work, were surrounded with difficulties which to the present generation of porcelain workers would appear insurmountable, yet they did porcelain work that was both useful and ornamental. These early workers had none of the conveniences of to-day, but they opened the way for those who were to follow and laid the foundation for a higher art in dentistry—the superstructure of which we are still building. To-day we are face to face with what I would call the porcelain era. We have had the gold era and the era of plastics in operative dentistry, and the metal and vulcanite eras in prosthetic dentistry.

The earlier uses of porcelain were confined mostly to full dentures and individual crowns, and the dentist compounded his own bodies, and moulded, carved and baked every tooth he used. Thanks to the manufacturers, however, this feature of the work has been done for many years much better than we are able to do it and at a great saving of time and labor. So with the cooperation of the manufacturer there has been a steady improvement in porcelain teeth until to-day we are supplied with every conceivable type and tint of color and in unlimited quantities.

The full denture of porcelain has been but little improved since the introduction of the continuous gum with porcelain base, and while this class of work stands preeminent from an artistic and sanitary standpoint, it has never come into general use because its construction was beyond the skill of the majority of the profession, and the cost beyond the purse of the patient in most cases, so that to-day the continuous gum denture may be classed as a luxury enjoyed only by people of means.

The all-porcelain bridge as made by the majority of operators has been a failure and is comparatively little used to-day. The rigid truss with saddle, close joints united with platinum solder, and a better knowledge of the inherent friability of porcelain and its limitations have been the means of reducing the failures, but notwithstanding the great possibilities of this material for bridgework, it is used but little more for this purpose than for full dentures. The improvements in the individual porcelain crowns have been simultaneous with those made in bridgework, and while they are extensively used their employment is comparatively limited.

Within the last decade porcelain as a filling material has occupied our attention, and during the last four or five years it has been the all-absorbing question in the minds of the profession the world over, and to-day it is fully established as one of our most valuable aids. The profession has successfully evaded the necessity of adopting porcelain in its various uses in prosthetic work, but its employment as a filling material will come of necessity if not from choice. The public will in time demand it, and the man who fails to equip for this work will not only be a loser in dollars and cents, but a loser in the satisfaction that comes from giving his patients the best possible service. The manufacturers have supplied us with sets of teeth and crowns that have met the requirements admirably, but the inlay we must manufacture ourselves for each individual case. We must learn to do this as we have learned to make gold fillings and every other operation we are called upon to perform.

Now that we are well along in the porcelain era in dentistry the question naturally arises: What is the future of this material that seems to so nearly approach the ideal for all dental purposes? It is my belief that it will in time be the agent most commonly employed in all dental operations. It is already rapidly supplanting other materials for fillings, and we may naturally expect a decided development in its various other uses as a result of better knowledge of its manipulation and improved product and equipment.

In an editorial in the January issue of the *International* Dr. Truman says, "If we may judge from the past, taking in view the origin of gold as a filling material, until the period when it reached its greatest perfection in practice to its decline as an absolute standard of excellence, we may confidently assume that the day will come when its use will be classed as belonging to the barbaric period in dentistry. This may seem an impossible conception, but we have not far to go for a basis upon which to build a prophecy of the future. It is very possible that the present craze for porcelain fillings may eventually reach a lower level than it occupies to-day, but the present indications point directly to the time when it will supplant gold in the large majority of cases coming under dental care, and that plastics, in form, will subserve dental purposes for the remainder. This to the gold worshipper is an inconceivable idea, but if he will only review his dental history he will find, as stated, that there has been a gradual but very sure departure

from the old ideas, and dentistry in this country could not go back, even if desirable so to do, to the period antedating the new departure creed. Change is in the air and the restless life, ever seeking something new, will drive us on until gold is no longer known as a filling material for the salvation of teeth."

Porcelain as a filling material more nearly approaches the ideal than anything we have to-day, and when properly used will prove a better tooth saver than either gold or amalgam. I predict that the time will come when it will almost entirely supplant gold for all cavities, and it is also not improbable that its manipulation and application will be so simplified that it will take the place of amalgam in many instances.

There are men who are still discouraging the use of porcelain, insisting that it is a fad, and some are predicting disaster and ruin to its users, but I have observed that as a rule they are men who have never used porcelain to any extent themselves and have based their opinions upon observation rather than experience, and since our failures are more often seen by our fellow practitioners than our successes, it is unfair to pass judgment in view of such evidence. There is another class who through injudicious use and a lack of knowledge of its manipulation and application have made a failure in its use, and they are condemning the method and material when in reality the fault is with themselves. On the other hand, we have such men as Land, the Capons, Head, Taggart, Reeves, Thompson and others who have given it the test of time, and who by their untiring efforts have brought it up to its present state of perfection and usefulness, as staunch supporters of its real merit as a filling material.

The fact that porcelain has a greater range of application, is more permanent, more compatible, harmonizes in color better, is more sanitary, and requires less physical exertion upon the part of both patient and operator than any other material will force its universal adoption in time. When I say that it has a wider range of application I refer to its use in the hands of those who know how to manipulate it. As already stated, there are but few cases where gold is indicated for the anterior teeth, and for all large cavities in molars and bicuspids porcelain will do better service than either gold or amalgam.

That porcelain will prove the most permanent of all filling ma-

terials I am thoroughly convinced. In six years of personal use I have yet to see a case of recurrent decay, and the testimony of men who have been using it for fifteen or more years substantially establishes this as a fact. This feature alone is of no mean importance in a great many mouths.

The most likely failure of the porcelain filling is bodily displacement, and when this occurs the patient is cognizant of the fact at once and seeks repair before any further damage occurs; while in the case of either gold or amalgam fillings decay may go on under and around them until the tooth is almost entirely destroyed before the patient is aware of anything wrong. The replacement of the filling invariably means that it is all to be done over again from the foundation up, while with the inlay resetting is usually the only requirement.

In compatibility nothing compares with porcelain. It is wholly devoid of thermal and electrical conductivity and is free from expansion and contraction. These are very desirable and, indeed, essential qualities where the vitality of the pulp is to be preserved and frail enamel walls are to be left standing.

The possibilities of this material from an esthetic point of view are simply not approached by anything else. Even in the hands of the novice no such incongruities of harmony will occur as with gold or amalgam, and in the hands of those skilled in its use the most conspicuous cavities can be so filled that the casual observer will fail to detect them.

The porcelain filling being impervious to moisture and having a highly glazed surface to which foreign matter will not adhere places it in the first rank from a sanitary standpoint. This feature establishes a very desirable condition, favorable not only to the tooth being repaired, but to adjacent teeth and gum tissues as well.

The physical exertion required to perform any operation as it should be done ought not as a rule to be considered; but in some cases it becomes imperative and here porcelain offers a happy relief to both patient and operator. Porcelain has been called the lazy operator's friend and a make-shift for the timid patient, but be this as it may, I am willing to be called lazy, and I notice that my patients are willing to pay me larger fees for my laziness, are as a rule better pleased, and are more tolerant of failure.

The above-mentioned features inherent in the material itself are sufficient to force its adoption in time, but with added strength, simplified methods and improved equipment in general we may reasonably expect much more rapid development in the future than in the past. Another sign of progress is the attention that is being given by the colleges to this department of work, and very soon instead of being a "side show" I expect to see porcelain take first place in both operative and prosthetic departments.

Discussion. *Dr. J. Q. Byram,* Indianapolis: I believe it will take time to get the profession interested in porcelain inlays, as they may be considered a fad by some, but when crown and bridgework was first introduced by the profession it was considered a fad, and it was not uncommon to hear people say that they would not have their teeth crowned. This work may be carried to extremes, the same as crown and bridgework has been, but because a few men go to extremes is no reason why we should condemn it. Porcelain is not a fad and is here to say, but I do not entirely agree with Dr. Roach, for I believe that gold and amalgam will always have their place as filling materials. Those who condemn it have usually seen only two or three porcelain crowns. I believe, however, that we are expecting too much of porcelain, but don't condemn the material because at the start it does not come up to your ideal, as you will feel more encouraged in this work later on. In using porcelain we have a material that is more steady and firmer than other agents, also one that will be permanent. While gold fillings do not drop out as inlays do, many of them ought to drop out. There is no such strain on the patient in making porcelain inlays as in gold fillings, and I can do the principal part of the work at my desk. The patient also will become interested in the work, as most of our patients have a keen appreciation of art and anything that appears to be artistic appeals to them. Finally, a great deal of time can be saved by the use of porcelain.

Dr. W. T. Reeves, Chicago: I know from personal experience that Dr. Roach has not overstated the case in any particular, and he has not left much room for discussion, but I will add a few things in another direction that may induce you to take up the work. When you have acquired the manipulative skill you will

be able to do at least twenty-five per cent more work in the same length of time with porcelain than you could if you filled the same cavities with gold, and you can get a better fee for porcelain than you can for gold, as the patient appreciates it more. Dr. Roach has brought many excellent reasons before you, but if it were only that you would be able to care for more patients, execute your work in a shorter time, and obtain higher fees for your services, that ought to induce you to take up the work. In this paper it was hinted that porcelain is greatly in demand to-day and will be more so as time passes. The community is finding out from people who have had this work in their mouths for years that it is more permanent than any other work they have ever had, and I believe that the dentists who persist in discouraging the use of porcelain and insist that it is a fad and is being used too extensively will lose their patients when the latter learn that porcelain is more desirable. There are some practitioners who are not able to accomplish as much with porcelain as they should, and some harm is being done by them because they do not know how to use it properly. In overusing it you take advantage of the good of porcelain and have disastrous results. There are many who use it without any conception of the cavity preparations, which for porcelain are different from those for gold, and if you have not properly prepared the cavity you will have trouble. A skillful worker in gold will make a good worker in porcelain; a medium worker in the former will have the same success with the latter, and a poor worker in one will be equally as poor in the other. We have more facilities to-day than we had several years ago, and you should not wait, thinking that there will be something better in the future.

Dr. M. A. Mason, Fort Wayne, Ind: I believe many dentists fail because they do not select good material to begin with, as we should use care in the selection of our material. The position that Dr. Roach takes will most certainly carry him to success. I know that if we could have begun the talk in school of porcelain inlays that we had of gold crowns we would have made just as much success with porcelain inlays as we have with gold, and I do not see why we should not in the same number of years.

"EASY MARKS" IN DENTISTRY.

BY F. R. HENSHAW, D.D.S., MIDDLETOWN, IND. READ BEFORE THE NORTHERN INDIANA DENTAL SOCIETY, AT HUNTINGTON, OCTOBER 18-19, 1904.

Modern dictionaries do not define the phrase "easy mark" as applied to people of the twentieth century, but by a combination of definitions we might arrive at something like this—An "easy mark" is an individual who possesses money (more or less) from which he is readily separated by some other individual whose principal stock in trade is "hot air."

The easy mark is a natural product of the greed for gain, both on his own part and on that of the man who works him. If this were not the case he would not listen to the siren's song of the sharper nor would there be any sharper to sing it. Perhaps the first of the tribe of easy marks was Esau, who, you may perhaps remember, was so foolish as to sell his birthright for a mess of pottage. He has had many descendants.

If the wise Polonius had been sending his son, Laertes, to a modern dental college instead of to the Court of France, he could have given him no better or more useful advice than when he told him: "Give every man thy ear, but few thy voice," only he would probably have added, "or access to thy pocketbook."

The American people seem to be peculiarly susceptible to all forms of graft, and between the man who buys a bottle of patent medicine and a ten-dollar bill for one dollar from the street fakir, and the one who buys a gold brick—and I am informed that this time-honored method of separation still exists—there is only the difference formed by the size of their bank accounts.

From a dental standpoint there are two classes of easy marks—the dentist himself, and the dentist's patient, and the greatest of these is the first. The average dentist is not a business man. No one ever heard of any great captain of industry who began life as a dentist. Of course, we now and then hear of a dentist who has become wealthy, but usually on investigation find that he made his start by falling in love with and marrying some rich man's daughter, afterward being allowed to manage the estate, upon which he retires from practice and becomes president of her bank.

It is in no wise singular that he should not be versed in business

lore, for his training is against him. From the time he enters a dental college all of his aims and efforts are, or should be, along professional lines, far enough removed from the business world to prevent his being in touch with purely business enterprises. If he enjoys a large practice his time is so taken up by the actual requirements of his profession that he has none left for the study of problems that confront men in commercial pursuits, and if he be not blessed with such a practice he usually puts in his time trying to get one.

Consequently, when the average dentist tries to "break in" on some apparently productive field, foreign to his profession and training, he is pretty certain to become an easy mark. There is a vast horde of sharks who are always in waiting for just such prey, and he is a happy and a lucky man who once ventures within their reach and escapes unscathed.

To illustrate this point. There was a few years ago a dentist living in Indiana whose reputation and practice were par excellence. He had accumulated several thousand dollars—not through careful business methods, but simply because his income was greater than his expenses. One day he was introduced to a man who was the representative of a land company dealing in some cheap lands in one of our western states. It was a scheme of colonization and on paper it looked good. The gentlemanly agent—all agents should be gentlemanly—displayed references from any number of banks and men of prominence, and by facts and figures—they say that figures won't lie, but it has often been proven that liars will figure—demonstrated that a few thousand dollars invested in his company would bring such golden returns that the investor might lay down his "working tools" and pass his remaining days in ease and affluence. The prospect was so flattering and the results so sure that, after consulting some friends who were also going to invest—it afterward transpired that they did not—Dr. X. invested practically all of his savings in the enterprise, sold his practice, and went to see for himself as one of the directors of the company. After a stormy existence of a few months the "company" went broke, the available cash having disappeared in some mysterious manner, and all this "Director" had to show for his money were some worthless papers and some valuable experience. He was compelled to come

back and try to recover his lost practice, which was all the more difficult because he was no longer a young man and was laboring under the handicap of a failure. This is only one of many examples of like kind which are familiar to all of us.

Then there is the "method" fakir, who sees in the dentist an inexhaustible field for his graft. He comes smilingly into your office, begs a few of your (more or less) precious moments, and introduces you to a "method" that is bound to revolutionize the practice of dentistry in its particular field and which he offers to disclose to you, exclusive right, etc., for the small sum of $25.00. Now, if there is one thing above another that will appeal to a dentist it is a new method for doing anything. That is what brings us here to-day and to all meetings of this kind, the only difference being that those who really have the welfare of their profession at heart are only too glad to impart all their methods to all who will come and learn, "without money and without price." But not so our method fakir. After dilating on the many advantages to be derived from knowing what he has to sell and by a judicious application of "hot air" he wins us over and we pay him his price for a thing that nine times in ten is utterly worthless to us.

A few years ago a fellow came into my office, introduced himself and asked for time to demonstrate a method. I had always prided myself on being proof against these fellows, but this one was too much for me, and after an exhausting siege, in which he employed everything from heavy artillery to a cannon firecracker, I surrendered and paid him the money. I also think he gave me a demonstration of his method, but on this point I am not quite sure. After we were all through he asked me as a special favor to give him a letter of recommendation, and just to show that I was no easy mark I gave it to him. Just what he did with that letter I do not know, but I am satisfied that he didn't burn it, for in a short time I began to hear from my friends over the state, usually in no moderate terms. One asked me if I got a percentage; another wanted to know where I put the time I saved by using this method, and one sober-minded friend asked if I had ever been in the lightning-rod business. It kept me busy for a long time squaring myself, and I am afraid my reputation for good judgment has been unalterably tarnished, but the experience was worth the money—to me.

In dealing with our patients we are often afflicted with "easy-markitis"—to coin a term—and many a man has been the loser for his lack of business instinct in dealing with a refractory, obstinate or dishonest patient. We are all familiar with the old lady whose plate was broken "while eating bread and milk," and with the man whose fillings dropped out while climbing the back stairs on his hands and knees, but who of us knows exactly what to do with them?

An amusing incident happened in my own practice a few years ago. A man, I refuse to honor him with the title of gentleman, was recommended to me for some dental service. Never doubting his ability or inclination to pay his bills, I completed an extensive piece of work for him and was not in the least uneasy that he did not at once settle his account. After several months had elapsed I gently reminded him that a check would be acceptable—no response. Again I reminded him, not quite so gently, but his response was as gently missing as before. These reminders and failures to respond were continued for about a year, and I had almost given up all hope when he suddenly appeared in my office one day, and, smiling sweetly, asked, "What is the amount of my bill, Doctor?" Filled with delight, I hastily consulted my ledger, and, as sweet as he, told him the amount. "Mark her off, Doctor, mark her off," said my friend, and I hurriedly and thoroughly marked "her" off. "Now," said the knave, still sweetly smiling, "the very first time I have the money to spare I am coming in and pay that bill." "She" is still marked off.

Very often we lose a patient by not adhering to strict rules of business in our dealings with him, and, worse still, we often lose his account for the same reason. Some men can charge and collect better fees than others simply because they are endowed, either by instinct or education, with a better business ability, and we are all familiar with examples of cases in which men of mediocre ability are able to secure and hold large and lucrative practices, while their neighbor, who is a man of far greater ability and professional attainments, has to be satisfied with a much less remunerative one, simply because he has not those qualities of person and manner—and these are part of the business man's stock in trade—which attract people to him.

Always to be taken in connection with the dentist are the dental

supply men, and they are also often included among the easy marks. It has been charged that the supply men are a set of grafters and birds of prey, who lie in wait for the unsophisticated young fledglings of the dental colleges, and as soon as the protecting dean's back is turned pounce upon them and devour them bodily. My own experience and that of many of my friends has proven far different, and instead of being an all-devouring Cyclops the supply house man has been our best friend.

When a young man of small means, or more often no means at all, leaves his college as a graduate he is at once confronted with the necessity of an equipment for an office. If he has no one who can or will furnish the money he applies to the dental depot, and unless he is a known deadbeat, he is invariably given such credit as to enable him to start in practice. It is charged that he is then bound body and soul to this same supply house, and that he is overcharged for his goods because he cannot help himself, but again my own experience leads me to deny. When I left college I had not sufficient money to buy an engine and chair, so rented them from a well-known firm at so much per month. After paying the rental for a number of months I decided that I was able to own them myself, and when the deal was made I was given credit for every cent I had paid as rent. This surely does not look like grafting.

I believe the supply houses as a rule are more sinned against than sinning. A friend of mine recently bought for his son, who is a student in a dental college, for the sum of $25.00, an outfit of instruments, both operative and prosthetic, that were worth at the least calculation $200.00. The circumstances of the case were this. A young man graduated from college, and, having no money, went to a dental depot and obtained credit for his outfit complete, upon which the dealer held a mortgage. He opened an office in an Indiana town, and instead of paying his original indebtedness added more to it among his townspeople. When he had reached the limit and was ready to leave the town (and also the profession), instead of turning the goods over to settle the mortgage held by the man who had first befriended him, he gave all his operative and prosthetic instruments into the hands of a man to whom he owed $25.00 for liquor, who sequestered them, and when the agent of

the supply house attempted to replevin the goods only a chair and part of an engine could be found. Who was the easy mark in this case?

No dental meeting would be complete without the supply men, who go to great trouble and expense to exhibit things of interest, and the success of every meeting depends in no small measure upon them. Personally I consider them a set of good fellows and undoubtedly easy marks.

Next to the dentist himself the easiest of the easy marks is his patient. Truly has it been said that "the American people like to be humbugged," and unfortunate as it is, nevertheless it is undeniably true that no greater humbugs exist than those pertaining to dentistry. It has been possible until recent years for almost anyone, whether he had the necessary training or not, to enter the practice of dentistry, and thus it has happened that some of the worst charlatans of the times have perpetuated their grafts in the name of dentistry, and those who have tried to be professional in their conduct have had to bear the stigma of it.

One of the most seductive means adopted by the grafters has been the advertisement of operations without pain. This appeals to everyone and is one of the most difficult things the legitimate practitioner has to combat. Anyone who has ever examined the cavity preparation employed by these "painless" ones can readily comprehend why they do not hurt their patients, as they rarely remove even the superficial decay. This might well render any operation painless—also worthless.

One of the most flagrant cases of actual dishonesty that ever came to my notice happened recently. A lady went to a so-called dentist—he had a diploma from a recognized dental college—and after about one hour of painless operating he informed her that he had inserted seventeen fillings. She paid her bill and thanked him profusely for being so gentle. Upon examining her mouth a few months later no trace of more than eight fillings could be found, all of which were located either in "pin-head" cavities made with one cut of a bur or in natural fissures from which the original caries had not been removed.

Cheapness, too, is one of the things advertised to catch the uninitiated, and unfortunately it is usually those who are least able to stand any financial loss who are victimized. Fear of pain, the

instinct for bargain-hunting or dire poverty are the elements which most tend to make easy marks for the dental grafter.

The ideal dental practice should be conducted upon such substantial business lines and by such business methods that these things could not happen, but so long as we drift along as our fathers have drifted so long will we continue to be a happy family of easy marks.

SOME CHANGES IN DENTAL PRACTICE MADE NECESSARY BY MODERN SCIENCE.

BY C. M. WRIGHT, D.D.S., CINCINNATI. READ BEFORE THE EASTERN INDIANA DENTAL SOCIETY, MAY 3, 1905.

If we could draw a picture of the daily practice of the dentist of fifty years ago, and compare it with the practice of the up-to-date dentist of to-day, we should find that the difference between the two pictures would not be so marked as to cause great astonishment on the part of the beholder. The modern appliances and conveniences for saving labor and accomplishing results might attract attention, and the machines would call forth praise, but the contrast would be between the instruments of that time and this, rather than between what we understand as the "practice."

There has been no change in the number or character of the diseases of the oral cavity. No malady has arisen *de novo* during the past fifty years. At that time caries and erosions of the teeth, acute and chronic inflammations of the gums, and chronic suppurations from the tooth sockets were as prevalent as they are to-day. If we take down from our library shelves the dust-covered volumes of Delabarre, Jourdain, Bond, Harris and others of the translations from the French, and the text-books of that day, we shall find accurate descriptions of tumors, cysts and inflammations of the jaws, and of caries, erosions, malformations and malpositions of the teeth. We shall also find interesting dissertations on the diseases of the dental pulp; of alveolar abscess and of exostoses of the roots; of deposits of different kinds of tartar, and of loosening of the teeth in their sockets. Epulides, necroses and fractures of the maxillæ are clearly described.

The daily practice of the average dentist consisted of a great variety of important operations on the teeth themselves, and re-

placing them by artistic artificial substitutes when they were absent. The tartars were removed by specially designed scalers, some of these being instruments of exquisite design, with pearl handles in which jewels were set. After the operation of scaling, the teeth were polished with orange-wood sticks—the short pieces fixed in "portes"—and loaded with water and ground pumice, precisely *a la mode du* Dr. D. D. Smith of to-day. Loose teeth and roots, and roots with chronic abscesses were deftly extracted; remaining teeth were examined with fine explorers, and carious spots in the crowns of firm teeth were excavated and filled with gold or tin foils, amalgam (this always under protest), gutta-percha or oxychlorid of zinc—called at that time "os-artificial."

Inclined planes made of silver or gold plate, the screw, the wedge and elastic bands were employed for regulating the front teeth after free spaces had been made by the extraction of bicuspids or first molars. Exposed pulps were devitalized with arsenic or "cobalt" and removed with broaches, and the root canals filled with cotton and creosote, tin or gold foils, silk thread, wood slivers, oxychlorid, etc.

Superficial caries and erosions were treated with nitrate of silver; sensitive dentin with hot creosote, oil of cloves, nitrate of silver, etc. Hand instruments were employed exclusively, and in the forms of chisels, excavators and drills were used for cavity preparation. Files in great variety of shape and thickness were freely employed for reparating and dressing the teeth and in finishing the metal fillings. Forceps and elevators were important instruments in every dentist's case, for the demand was greater for the operation of extraction at that time than at present in most communities. Teeth were extracted when they ached, when they were broken, when they were loose, and when they stood in the way of a good arrangement of artificial teeth. The constructing and adapting of artificial substitutes for missing teeth was a major operation in those days.

Incisors were frequently replaced by natural or porcelain crowns mounted on hickory pegs forced into the roots after their preparation by specially designed half-round files and drills. These operations were as perfect esthetically, i. e., in their concealment of art and restoration of natural appearance, as anything that is done to-day in this line. The faulty treatment of the canals

and the neglect of thorough emptying of the putrescent contents, and the lack of disinfections and sterilizations as known and practiced to-day cast this operation into disrepute and for years the prejudice against pivot teeth clung to the people. This prejudice affected for a while the dentist, who willingly substituted forceps and plates in thousands of cases which to-day would be considered most favorable for crowning. At that time, also, transplantation of a tooth from one patient's mouth to that of another, and the replanting of teeth that had been knocked out or extracted by mistake were not uncommon.

What do we do to-day that the founders of American dentistry and these early practitioners did not do? Bridges? In George Washington's time teeth carved from ivory or cut down from sheep or calves teeth were suspended from one sound tooth to another by ligatures of wire, making a suspension wire bridge instead of the more solid pier bridge of to-day. Skill and ingenuity of the highest order were displayed by the dentists of the olden times. I heard Dr. Wedelstadt last December in Columbus say in his most impressively dramatic manner that he uncovered his head and bowed with reverence to the memory of the old soft foil operator of forty years ago. He said it filled him with chagrin to be compelled to admit that he could not, by any effort, acquire the skill that was displayed by these soft foil men. It is like a lost art.

If, then, the number and kinds of buccal and dental diseases were the same, and if extraordinary skill was employed in the manipulative treatment of these diseases and deformities with bridges, fillings, crowns and plates—if, in other words, operative dentistry, orthodontia, prosthesis and surgery were practiced fifty years ago in fine style, what changes in modern practice are due to the advancement of science instead of to the improvement of machinery? We live in a scientific age. How has this science affected the practice of dentistry? I shall try to answer this question by claiming that the *principles* of practice have been placed upon an entirely different basis from that of the early practice—and this even when operations are identical. This proposition I shall try to defend by the following illustrations:

The early dentist removed carious dentin, shaped a cavity and filled it with Abbey's Foil for the sole purpose of combatting decay

and stopping the cavity. He did not know the etiology of caries, though he believed then that a perfectly clean tooth could not decay. The microscope had not exposed the bacteria, nor had Pasteur proved the relation of microorganisms to fermentations and specific diseases, but what difference did this make in practice, provided the dentist excluded the unknown cause and arrested caries? This is not where the change in principle occurs. It is in this—that the dentist of to-day does not fill teeth simply to stop decay. He labors for the restoration of contour and form of the tooth and for its ideal occlusion. He does this because the tooth is a part of an organ and not an organ itself. This organ embraces among its functions not only mastication, to which the nutrition of the entire body is related, but respiration in a more roundabout way, and voice in a distinct way. He considers broad principles of function. The flat, permanent stoppings of the part have given place to the mesio-distal restoring and the cusp-restoring shapes of teeth as units of an important whole. This one principle alone, based on increased knowledge of general physiology and pathology, and on the knowledge afforded us by the science of other medical specialists, has so modified the practice that it is not the same thing to-day to fill a tooth that it was fifty years ago. The principle underlying this one operation is new, and the reasons for performing the operation have so broadened that caries is only one of the things considered when we fill a tooth. We now regard the nutrition of the body—the health of the gums, the prophylaxis of the mouth, the preservation of the festoons of the gums, and, I am almost tempted to say, the structural development of the jaws of following generations.

I do not believe that as much skill is required to-day to fill teeth as was shown by fine operators a half-century ago, as the improved tools, the rubber cloth and electric engine have removed many of the serious obstacles that were always in the way of the older practitioners. The work has been simplified, thereby reducing the necessity for the cultivation of a high degree of skill.

A second point which I should like to emphasize is the change of practice in the treatment of interstitial gingivitis. The exhaustive histological work done on the tissues of the mouth has opened our minds to a far better understanding of histo-pathology. The physiology and pathology of one membrane—the pericemental—

is so clear to-day that treatment for cure and prevention of inflammatory affections of this vital attachment structure and vascular nourisher of the teeth occupies a large share of our time and skill. The surgery connected with this membrane is no longer a pioneer work, but is the result of the accumulated experience of a score of years. We now spend hours and weeks in treating, where a few seconds with the forceps completed the cure in the older days. This has required a rearrangement of our ideas about time, fees and general practice.

In this, too, we have had to combat the preconceived and inherited notions of patients and dentist, and such changes are difficult. The man who has always had free passes to the theater and on railroads is less inclined to appreciate the necessity and justice of having to pay for these privileges. From the custom of the older dentist to make no charge for simply cleaning the teeth or to make a nominal fee only, he placed his patients on the free list as far as this operation was concerned. To-day we suspend the free list for the thorough cleaning of the roots and crowns, which means the most delicate and difficult surgery which the dentist is called upon to perform, and may be the specialty of a practice. A half or a third of each day's service can be devoted to this one operation with the best of scientific reasons for a backing, and the best results as an end for present and future health of the teeth and of the patient. Certainly professional fees should keep pace with the importance of the operation. The treatment of the periodontal membrane is recognized by patients as legitimate practice, and is spoken of and demanded by them. How often are we told by patients that So-and-so has Riggs' disease. Knowledge of these things grows little by little, just as the knowledge of appendicitis and the mastoid operation has with the public. We know that increased knowledge of histology has initiated this change in our daily dental practice. When we remove calcareous deposits from the teeth, polish the exposed surface, and stimulate by massage the gingivæ, we are doing all this for broader reasons than the dentist of fifty years ago knew about. Therefore we now insist upon monthly or bi-monthly appointments with our patients and are adding to our list of regulars who are called by telephone for this prophylactic attention. This is a decided change from older notions of practice.

I have, as you know, claimed that there is room for assistance in this department of dental practice. I should like to have a class of trained women who would polish teeth and massage gums weekly, fortnightly, or at least monthly for children, youths and refined adults, and bear the same relation to the dental surgeon that the trained nurse and masseur do to the general physician and surgeon. Orthopedic surgeons employ women assistants who have been regularly trained as gymnastic teachers to direct exercises for the strengthening of weak or atrophied muscles in their little crooked patients; also women proficient in the art of massage to apply manual force on deformed patients for the stimulation of contractility in muscle circulation in capillaries, and for the various conditions in which irritations scientifically directed will arouse vital activity in wasted or wasting tissue. The oculist must have his private hospital and trained nurses or fall behind the demands of the times.

When we study Talbot of our own profession and other writers on the evolutions and degenerations of tissues, their origins and causes, we are impressed with the scientific value of the proposition that the stimulation of an organ, by normal use or function, is necessary for its proper development and continued health. It is made as vividly clear to us also that lack of use surely results in degenerations, either by atrophy or by metamorphoses of cells, causing final necrosis of some of the more transitory structures. These conditions are not temporary nor observed simply in the life of an individual, but as it has required ages to develop the structure in the perfect form, so the lack of use in preceding generations has increased a hundredfold the tendencies toward imperfect development or degenerating types in ours.

The law of inheritance is brought into prominence. This accepted science of our day has changed the character of orthodontic practice. Instead of extracting first molars and bicuspids, as the dentist of old did, to make space for the rearrangement of the incisors for appearance sake only, such men as Angle, Case and others too numerous to mention are struggling with entire dentures and maxillas to restore harmonious facial and functional arrangement. This is a higher orthopedic measure than the mere straightening of irregular incisors. In connection with this subject I have long felt that we should begin these orthopedic efforts with

infants before the eruption in many cases of the earliest incisors.

The infantile habit of sucking the thumb produces marked protuberance of the anterior segment of the maxillary arch. Adenoids, which sometimes arise from the failure of the third tonsil to follow its natural course and degenerate by atrophy, deflected septæ in the nasal tract, and some other malformations of the upper respiratory passages, cause mouth-breathing and consequent persistent lateral pressure by the muscles of the cheek on the growing maxilla of the infant. This interrupts or interferes with natural development and produces narrow arches and malposition of the adult teeth. It being true, then, that continued slight pressures in infancy anteriorly and outwardly as in thumb-sucking, and inwardly and laterally as in mouth-breathing, do produce malformations, certainly a wisely directed system of manipulation by the fingers of the trained dental nurse or of the dentist (if he will take this practice) in the opposite directions would expand the growing arch and guide the developing structures of the jaws along the lines of ideal form. We have all seen what the anxious and intelligent mother can accomplish for her child by finger pressure, even in torsion, on a single refractory incisor when she has been taught by the dentist how to apply the force.

The people of this age appreciate their teeth and the value of dental services. Millions of dollars are annually spent in America alone in efforts to keep the teeth. All classes, rich and poor, admire prefect teeth, and if the dental profession would promise to produce fine arches and pretty teeth by simple, painless manipulative measures in infancy, the demand for such orthopedic services would increase beyond our most sanguine calculations. It would become popular with the public for the above reason alone. These services would be also directly in keeping with our highest principle of dental prophylaxis. This view of the orthodontia and the prophylaxis of the future shows the importance of the kind of service which would be rendered by the woman sub-specialist under the scientific dentist's careful supervision.

To take up another point of my subject, let me say that there have been within a few years past advances made in physiologic knowledge in relation to the nutrition of the body. The subject of buccal, gastric and intestinal digestions and their relative values in the economy of the organism has been carefully studied by

laboratory experimental methods, and mastication preliminary to deglutition has come to the front as an important factor for two reasons: First, because thorough mastication of our cooked starchy foods, with the accompanying more perfect insalivation, assists in the digestion of these substances, because even after the bolus enters the acid gastric juice of the stomach the ptyalin fermentation continues for some time. Second, because this thorough mechanical grinding of all particles of food by prolonged mastication reduces the quantity and changes the condition of coarse and useless debris, which, finding its way into the lower bowel, makes of this simply a dumping-ground for useless food-stuffs. This refuse becomes as offensive as does the garbage dump on a city lot, and also affords a fine feeding and breeding ground for incalculable myriads of rapidly multiplying fungi. The emanations and poisonous products resulting from the activity of these bacteria are a constant menace to the health and even life of the human being. The toxic matter produces inflammations of the lining membranes of the intestines, also escaping and poisoning the blood. Modern science has clearly shown the cause of autointoxications and septic infections, many of which result in serious, distressing and dangerous acute and chronic diseases. We can almost agree with Metschnikoff in his prophecy that the surgery of the future will include the operation of removing for sanitary reasons a large portion of this dumping tube. Sir Michael Foster and other distinguished physiologists have lately been deeply interested in experiments proposed by Horace Fletcher, which tend to prove that prolonged and thorough mastication of food-stuffs will so diminish the quantity of debris that the lower bowel will be changed from a dumping-ground to a simple passage for normal waste products.

Dentistry is particularly interested in the experiments now being made in physiological laboratories along this line, for improved mastication must imply a perfect apparatus, and our modern orthodontia and operative dentistry become of greatly increased value to the people—not for esthetic reasons alone, but as prophylactic against imperfect general nutrition and positive disease from autoinfections. This changes again our principles of practice and accentuates the importance of our professional services. It broadens our field and draws us directly into the inclosure of medical practice, whether we will or not.

There is one other point which I think will help us in our contrast of the old and the new principles of practice of dentistry. On account of science we are becoming more and more concerned with the relations between buccal secretions and the general health—more concerned with the relation of conditions of the mouth with membranes and organs remote from the oral cavity. There is a little book published by Cassell & Company in 1901, and written by William Hunter, M. D., F. R. C. P., of London, on the subject of "Oral Sepsis as a Cause of Septic Gastritis, Toxic Neuritis, and Other Septic Conditions." Dr. Hunter lays great stress upon the fact that medical men overlook the importance of oral sepsis, while treating with medicines, diet and change of climate, certain persistent catarrhal troubles of the stomach and intestines, of the larynx, pharynx, tonsils and bronchial tubes, of skin trouble, nervous exhaustions, etc. He criticises the surgeon who is punctilious to a degree—and rightly so—in seeing that, so far as local scrubbing and disinfection can effect the result, no single septic organism shall remain in the portion of skin upon which he operates, to contaminate the wound; who regards, and rightly so, even one drop of pus in connection with a wound as an evidence of sepsis and of partial failure on his part to attain the perfection of results. The surgeon's whole life, it may be said, is passed in excluding and combating septic infection even in its slightest degree; he also, without hesitation, will perform the most complicated and severe operations, *e. g.*, on the stomach or intestinal canal, without the slightest regard to the presence of septic teeth, septic roots, septic condition of the gums and buccal membranes of his patient. I have quoted this sentence about oversight of the surgeon from Dr. Hunter's book, and will quote his criticism of the dentist:

"The dentist who does so much for his patient in these days of conservative dentistry and high professional dental skill, who sees so much of the unhealthy oral conditions connected with dental caries and necrosis, who, on the strength of his experience, can reproach the physician for his neglect of such conditions; he also will skilfully gold-cap a tooth or put on a gold bridge, or supply a patient with tooth plates—the gold cap to cover a diseased and blackened tooth, the bridge to form a compact and inaccessible pocket for the growth of pus organisms between itself and the gum, the tooth plate to be worn for years without any cleansing other than scrubbing,

and as often as not covering foul septic necrotic stumps. Plates so ill-fitting that rather than be troubled with their removal the patient allows them to grow into the gums."

In regard to this opinion of the Doctor about the dentist I am justified in claiming that this reckless disregard of the septic conditions of the mouth is not recognized as modern dentistry. It receives the condemnation of the majority of dentists of to-day, because of the advance in knowledge in these matters of sepsis and sterilization.

A few days ago a jury in one of the courts of Cincinnati adjudged damages to the sum of $3,500 against a dentist in favor of a patient who had blood-poisoning and necrosis following the extraction of a tooth. The grounds of the award were that the dentist had used a dirty pair of forceps which he took from the pocket of a dirty operating coat. This would in the minds of all of us be a sufficient reason for the decision of the court on general principles of decency, but we know that if the forceps had been thoroughly sterilized, and taken from the sterilized pocket of a sterilized office coat, and used by clean hands with sterile finger nails, and by a dentist with a shaven face—all of what we ascribe to septic poisoning might have followed if complete removal of septic matter from the tissue to be operated upon had not been attained. If the dentist had neglected this one point in cleanliness and sterilization, namely, the aseptic treatment of the patient's mouth before operating, he would be guilty of criminal negligence. This is another change in the daily practice of the dentistry of to-day which modern science has made necessary, and which was beyond the comprehension of the most dainty of the older practitioners. We find, then, that even in the most frequent operation of fifty years ago a change in practice has been found necessary, and that extraction has ceased to be simply a skillful yanking and jerking of a tooth and has passed securely into the realm of aseptic minor surgery. The principles underlying this operation have changed. This demands more time and care and scientific study on the part of the modern dentist aside from the actual finger craft.

NEW PORCELAIN CROWN.

BY C. H. WORBOYS, D.D.S., ALBION, MICH. PRESENTED BEFORE THE SOUTHWESTERN MICHIGAN DENTAL SOCIETY, AT KALAMAZOO, APRIL 11-12, 1905.

I will describe what to me is a new method of adapting a porcelain crown or hood to a natural tooth, which does not require a knowledge of porcelain technique or that the pulp be devitalized and removed.

The tooth that is to be operated upon should first be anesthetized with cocain and then the enamel ground off, leaving a shoulder just below the gum line and the stump conical in form, and if practicable leaving sufficient dentin to protect the pulp.

The substitute that is used in this operation may be a countersunk pin tooth, such as is used for rubber plates, a Davis crown, or any other porcelain tooth or crown that has a hole in its center, the larger the better usually.

An impression is taken of the prepared stump in white sheet gutta-percha with a tray made of a band of German silver or copper, shaped to fit the gum on the labial and lingual sides. For this purpose I have found that a shell, such as is used for a seamless crown, that can be placed between the adjoining teeth, is very convenient.

The gutta-percha is warmed well, placed in the tray, carried firmly to place, and held until it cools. It must be carefully removed, then a piece of the sheet gutta-percha, about three-fourths of an inch wide, is warmed and wrapped around the impression and tray, the edges being stuck together. The impression is then poured full of any of the low-fusing alloys, producing a model of the stump on which to roughly fit the crown, which is done entirely with grinding stones. For the grinding I like the carborundum stones mounted with shellac. The gem stones are necessary to grind the inside of the crown so that it will fit over the stump.

By painting the metal model with oxid of iron and glycerin you can tell where the crown strikes on the model, and by frequently trying on the crown and grinding carefully it can be made to fit very closely, occasionally trying in the mouth for noting correct position. The final fitting should be done in the mouth, where the stump is to be painted and the crown ground, or the crown painted

and the stump ground, as you prefer for the best interests of the case.

When the crown is fitted and ready to set the stump should be cleaned and dried, then a quick-setting inlay cement is mixed thin and placed in the crown and the latter fitted as soon as possible.

DOES IT PAY?

BY C. G. KEEHN, D.D.S., LIGONIER, IND. READ BEFORE THE NORTHERN INDIANA DENTAL SOCIETY, AT HUNTINGTON, OCTOBER 18-19, 1904.

Does it pay to spend so much time and money getting ready for and running about attending these dental meetings? Could we not better serve our patients by reading and study at home, and be money ahead? What do we really gain by taking part in these meetings? First, in the preparation of something to present that would be of interest and a stimulus to our fellow practitioners. While many of us are imitators to a great extent there are innumerable little things we do that would be a benefit to others if we should tell them. It has been well said that men of intellectual and moral culture who are not active forces for the upbuilding of humanity are not worth what it costs to produce and keep them, and I think this applies equally well to the members of the dental profession. It matters little how intellectual or skillful a practitioner may be if, through indifference or selfishness, he does not assist in the upbuilding of his profession by giving to it the benefit of his skill and intelligence. By helping others he will also at the same time make himself stronger, for in the preparation, in the writing and study, rejecting that which is false, examining that which is doubtful, and retaining that which is true, he is the gainer as well as they to whom his thoughts are presented. Men of enlightenment without influence are the poorest kind of rubbish.

Second, by association. I believe that one of the greatest helps a young man can receive is by forming acquaintances and by association with the best men of his profession. A good many of the young men of this society can look back and remember how they appreciated the kind words spoken to them by the older members when they first began to attend these meetings. I personally

remember two incidents especially that took place at these meetings several years ago which made indelible impressions on my mind. One occurred at the first meeting I attended, when the late Dr. S. B. Brown extended his greetings, asked how I was getting along and if I was meeting with any obstacles in my practice in which he could be of any service to me, assuring me that if at any time I should like his advice he would be glad to give same. Not long afterward I had occasion to write him, and I wish you could have read his reply, but you who knew him realize that it was full of instruction and encouragement. The other incident occurred at a meeting which Dr. Black of Chicago attended, and when I went home I could not help but think that had I not gained anything else at that meeting but the half hour's conversation with the Doctor I would have been well repaid for attending. Think of the contrast between meeting such men and those who never pronounce their own names without involuntarily taking off their hats, so profound is their self-admiration.

I believe moderate and sensible commendation given occasionally is of great service to the reputation and fortunes of men, while immoderate, noisy and fulsome praise does no good, but rather harm. First, the latter plainly betrays itself to proceed from an excess of good-will, or to be designed rather to gain favor with the individual by false encomium than to paint him justly. Second, modest praise generally invites the company somewhat to improve, but immoderate flattery detracts and takes away.

Third, observation of the clinics and the exhibits. If we would but leave our prejudices and narrowness at home when we attend these meetings, and accept with an unbiased mind what we hear and see, we would certainly gain more. We are too ready to criticise what we see, failing to remember that it is better to be able to do a thing than it is to belittle a thing that has been done, or that the man who never makes a mistake does not know the real pleasure there is in being right. While in a great many clinics that are given the results shown are exactly what you obtain, yet in some particular time is saved and the saving of time is a great factor in all our work. It has been said that the invention of the friction match saves every day for every active man and woman ten minutes of life, and the little hints picked up often change our entire mode of doing some certain operation.

Fourth, assimilation. Ignorance is the most potent factor in setting limitations for the majority of mankind, and the great majority of people continue to live their little dwarfed lives simply by virtue of the fact that they do not realize the larger life to which they are heirs. I believe that to the degree we open ourselves to the inflow of professional advancement we are changed from mere men of our profession to professional men. Let me employ an illustration used by Ralph Trine, of the lotus pond on the farm of a friend of his. It was supplied by a reservoir with water from the foothills some distance away, and a gate regulated the flow of water from the main that conducted it from the reservoir to the pond. The pond was a spot of transcendent beauty. There through the days of the perfect summer weather the lotus flowers lay full blown upon the surface of the clear transparent water, the June roses and other wild flowers were continually blooming upon its banks, the birds came there to drink and bathe and from early till late one could hear the melody of their songs in a beautiful grove in which many kinds of wild berries and a great variety of brakes and ferns grew. This friend was a lover of his kind, and at the end of a beautiful byway that led through the wildwood up to the enchanting spot stood a notice—"All are welcome to the lotus pond." One found here merry groups of children at play, and everything in the immediate vicinity seemed to breathe a spirit of kindness, comfort, good-will and cheer. The gate of the pond was always open wide enough to admit a supply of water so abundant that it continually overflowed sufficiently to feed a stream that ran through the fields below. Later the farm was rented to a man who, as the world goes, was of a practical turn of mind, and he did not have time for anything that did not give him material returns. The gate was shut down, the notice of welcome was removed, no longer were the gay companies of children, men and women seen at the pond, and a great change came over everything. On account of the lack of life-giving water the foliage wilted, the fish that formerly swam in the clear water died and gave an offensive odor to all who came near, the flowers no longer bloomed on its banks, and the birds came no more to drink and bathe and fill the air with their sweet melodies. The difference between the spot then and the lotus pond when owned by the philanthropist was caused merely by the shutting of the gate.

Can we not see a complete parallel in the case of the man who throws open the avenues that lead to his professional advancement and the one who does not? And is there any better avenue to this advancement than by attending these meetings, associating with the advanced men of our profession, observing how they do their work, and when we have gone home and thought over what we have seen and heard, assimilating that which we think will be of benefit to us and our patients and discarding that which has been unsatisfactory? However, the trouble with most of us is that we allow ourselves to become set in our ways, and by doing things over and over again the procedure is so fixed that unless we inquire whether it is the best method or not we are content to continue in our own little rut. So it is likely to be with the man who locks himself up in his office, reads but little in the dental journals or society proceedings, and but seldom comes in contact with men of his profession. If we have not been doing what we should toward our professional advancement and have made mistakes we should not make them the second time by continuing to do the same thing again and again in the same old way.

DISCUSSION. *Dr. W. O. Vallette,* Goshen, Ind.: I feel that this meeting will do us a great amount of good and that each one who attends will be well repaid. Every dentist should endeavor to attend the meetings of his profession, because a vast deal of benefit can be obtained from them if one comes with the determination to learn all he can.

Dr. M. A. Mason, Ft. Wayne Ind.: Every dentist should attend these meetings and assist in the upbuilding of his profession. We also have an opportunity of seeing the new appliances to better advantage. I did not think that I could afford to go to my first dental meeting, but I went and was well repaid. It is a great advantage, especially to the younger dentists, to hear the papers that are read, listen to the discussions, and also take part in the meetings. We should all do our share of the work, and those who take part in the meetings are more satisfied than those who do not, just as the workers are always happier than the drones. Nothing binds a man to his fellows, his profession, and his society like taking an active part in its work and deliberations.

Digests.

RECENT OBSERVATIONS IN METABOLISM AND THEIR IMPORTANCE IN DENTISTRY. By Samuel A. Hopkins, M.D., D.D.S., Boston. Read before the New York Institute of Stomatology, February 7, 1905. In order to simplify the study of metabolism it is necessary to refresh our memories with a brief reference to protoplasm and some of its properties. The human body, as you know, is made up of various tissues which enter into the construction of the different organs of the body. We have nerve, muscular, epithelial, connective and other tissues, each of which has its particular protoplasmic cell, differing in some slight characteristics from cells of the other tissues.

In the complicated structure of the human organism it is difficult to study the individual cell. We have, however, in the ameba, a low form of protozoan life existing in every stagnant pool, an excellent example of a single protoplasmic cell without tissues and without organs, which has as complete a life cycle as has the complex organism which we call the human body. The ameba receives nutrition; it converts it into energy; it throws off waste and reproduces itself, and this is life. Weismann tells us that "no ameba ever lost an ancestor by death," the parent cell merely dividing to produce two children.

The tissues of our body are made up, as I said, of these protoplasmic cells, which are receiving nutrition, converting it into energy, and getting rid of the waste. Protoplasm is an albuminoid substance, which has no recognized histological structure of its own, yet builds up every animal and vegetable tissue. It consists of nitrogen, oxygen, carbon, and hydrogen, and a trace of sulphur in ever-changeable and unstable chemical combinations. Not to go into the recently advanced theory of electrons, it may be said that the shiftings of the molecular combinations of protoplasm produce every expression of life. The poet's dream, the artist's picture, the musician's symphony, and the knock-down blow of the prize-fighter are expressions of the ever-shifting molecular combinations of protoplasm.

I have said that protoplasm is an albuminoid substance, and it is therefore evident that the protoplasmic cells of the body must

depend upon nitrogenous food for their maintenance and activity. The proteids are the nitrogenous food substances which act as tissue-builders and furnish nutrition for the protoplasmic cells. These proteids also produce heat, especially when the carbohydrates and fats are insufficient for the purpose. They vary greatly in their solubility and in their products of decomposition. Abdelhulden gives the following list of nitrogenous substances which have been split from the proteid molecule which they go to form: glycocol, alanin, amidovalerianic acid, leucin, phrnylalinin, glutamic acid, asparaginic acid, cystein, lysin, aginin, histidin, and others. Buchner has shown that many of these have negative chemotaxis. Vaughan and Novy, in their excellent work on "Cellular Toxines," have pointed out that many of these substances are toxines capable of great activity. This must be borne in mind, because upon these numerous products of decomposition depend some of the most serious consequences of excessive proteid metabolism. Harrington gives us examples of proteid substances: gluten flour, egg-albumin, blood-fibrin, and casein. In a general way eggs and meat have a large proportion of nitrogen, and are among our favorite forms of proteid food. Carbohydrates may be looked upon as energy producers, and this energy, converted into heat, is measured by what we know as calories—a calorie being the amount of heat necessary to raise one kilogram of water one degree Centigrade. Fats assist in maintaining the body heat.

It is evident that before the food which we eat finds expression in the work which we do or the thoughts that we think, an infinite variety of chemical changes must take place, and metabolism may be said to be the sum of the chemical changes which take place within the body or within the cells, by which protoplasm is changed to perform special functions. The building up of the cell we speak of as anabolism, and its breaking down as catabolism; the complete process is metabolism. The protoplasmic cell in its absorption of nutrition has the power of differentiation; that is to say, as the blood-stream, laden with nutrition suitable for the various needs of the body, passes through the various tissues the muscle-cell will seize from it that kind of nourishment which is suitable for the maintenance of muscle tissue; while the nerve-cell, ignoring the elements of muscle tissue, will seize and appropriate that which is essential for its particular needs, and so on through

all the tissues. However, the presence in the blood-stream of appropriate nutritive material is not the only requirement for proper nutrition, as tired cells will not take up the nutrition presented; cells deprived of oxygen will not convert nutritive material into energy, and cells which do not receive proper exercise cannot throw off waste. Thus we have presented to us the necessity for normal rest, fresh air, and exercise. The inhibitive action of toxines and of diseases upon the metabolic changes in tissue-cells is very great indeed. Moreover, what I might designate as the electro-vital action of the trophic nerves, while undoubtedly dependent upon cell activity for its power, at the same time furnishes energy to the tissue-cells. You may have the arteries, veins, and capillaries of a given part in perfect condition, and filled with the best possible nutrition, and yet if you cut off that mysterious vital energy furnished by the trophic nerves life ceases and the part withers.

Physical chemistry, through the remarkable experiments of Professor Loeb and others working in this field, has shown that chemistry of living matter does not differ essentially from the chemistry of inanimate objects, although the chemistry of the body is carried on at a comparatively low temperature. It would only obstruct the easy comprehension of metabolism to dwell on the nature of the enzymes developed in the body, but it is known that these play an important part in cytology, and their action as catalyzers will doubtless explain many of the changes that go on in the tissues.

Traube discovered that every living cell behaves as if surrounded by a surface film which does not possess equal permeability for water and the substances which may be dissolved in it. Osmotic pressure can be measured, and the study of this subject and of surface tension has led to the deduction that every particle of protoplasm which is surrounded by watery liquid has on its surface a thin film of oil. Overton has shown that herein lies the explanation of the action of alcohol, ether, chloroform, and similar substances. These have a high degree of solubility in fats and therefore diffuse most easily in the living cells. We know that the brain- and nerve-cells are abundantly supplied with fat, and this furnishes a possible explanation of the anesthetic effects of the substances mentioned. Speck has shown that when the pressure of

oxygen in the air falls below one-third of its normal value mental activity is soon impaired and consciousness is lost.

Now, before taking up the matter of food and its conversion into nutrition to meet the requirements of the human machine, I wish to express my belief, founded on a reasonably careful observation of followers of *diet systems,* that anyone pursuing such a system long enough will end with chronic indigestion, just as surely as the man who follows a system in gambling will end in bankruptcy. The fruit and nut crank, the cereal crank who lines his stomach three times a day with a mush poultice, the beefsteak and mutton glutton, are in the same danger as the quick-lunch pie fiend, or the dependent on alcoholic stimulants. A reasonable combination of all these foods might make a very appropriate dietary, but a "food hobby," except as once in a thousand times it might meet some pathological requirement, will surely overthrow its victim sooner or later.

While I am far from advocating the system of prolonged mastication introduced by Mr. Horace Fletcher, I am only too glad to pay him a fitting tribute for work which he has done in calling the attention of scientific men and the general public to the possible advantages of a smaller amount of food and a thorough mastication of that which is taken. His explanations do not bear the stamp of scientific accuracy, and his methods are extravagant and difficult to harmonize with the exigencies of our daily life, but he has compelled the attention of scientific men and led to important research work. There is, I believe, grave danger in the Fletcher method, and instances have been lately recorded where the concentration of the mind on the mastication of food and its digestion in the excessive and seemingly ridiculous manner pursued by Mr. Fletcher has led to nervous difficulties in swallowing and to severe indigestion, while the attempt to jump suddenly from a liberal diet to the minimum quantity suggested by him has led to hyperacidity of the stomach and loss of contractile power in the intestines. There is always grave danger in a too rapid change of our habits of life, but much good may come of an intelligent and reasonable attention to the almost lost art of mastication. We, as dentists, ought to be especially grateful to anyone who arouses an interest in this subject. Our respect for our work and the recognition of its importance by

other people, as well as our usefulness to mankind, rest chiefly upon establishing the importance of mastication and salivary digestion.

Setting aside for the moment the subject of mastication, the interest of physiologists in Mr. Fletcher was due to the fact that here was a man in unusually good health, having extraordinary bodily energy and a clear, active mind, who was subsisting on a much lower daily intake of proteid food than that which had hitherto been supposed to be essential to the maintenance of health; while at the same time the carbohydrates, as indicated by the number of heat calories, were also considerably below the amount usually considered necessary. Professor Chittenden, of the Sheffield Scientific School of Yale University, whose book on "Physiological Economy in Nutrition" is a most important and fascinating one, had Mr. Fletcher under his observation for several months in the winter of 1902-3, and among other things asked him to go into the Yale gymnasium and undertake the work which the men in training for the crew were doing. To his surprise he found that Mr. Fletcher, who was about thirty years older than any of the students, not only went through the arduous exercises of the men in training, but showed less fatigue and exhaustion than did the students.

Some of this work is embodied in an article in the *Popular Science Monthly* for June, 1903. That which appealed to the scientist was not so much the value of prolonged mastication—which seemed especially to interest Mr. Fletcher—but the possibility of complete and satisfactory nutrition of the body on an amount of proteid food less than one-half that which had for generations been thought essential to proper nutrition. The standard established by Carl Voit of Munich has been accepted for many years According to this standard, an adult man, weighing from one hundred and fifty-four to one hundred and sixty-five pounds, and doing moderate work, requires one hundred and eighteen grams of proteid or albuminous food, fifty-six grams of fat, and five hundred grams of carbohydrates, having in all a fuel value of three thousand calories. To mark the contrast I will say that Mr. Fletcher, at the time he was under the observation of Professor Chittenden, was taking daily an average of 44.9 grams of proteid matter, thirty-eight grams of fat, and two hundred and fifty-three grams of carbohydrates, with a fuel value of only sixteen hundred and six calories.

If, now, it could be shown that the small amount of nitrogenous food taken by Fletcher was nearer a normal standard than that established by Voit, it would mean an enormous economy in actual dollars and a great economy to the body, which is of no less importance. It is obvious that the strain on the human machine in using and disposing of excessive proteid matter must be very great indeed. I may as well explain that carbohydrates are oxidized into carbonic acid and water, and except that these carbohydrates may cause an increase of fat which may be uncomfortable, and that they may in some cases give rise to forms of indigestion, they can do no particular harm even in excess, while the proteid foods, which are the builders of the tissues and play the most important part in cell metabolism, differ greatly, as I have said before, in their products of decomposition, many of which are undoubtedly poisonous. These products, absorbed by the intestinal wall and passing through the system in the blood-stream, are capable of seriously interfering with the functional activity of the various organs of the body, while they undoubtedly bear an important part in rendering the individual less resistant to disease. Biliousness is a very common disturbance which may be attributed to excessive nitrogenous products. The secretions of glands are frequently altered by the poisonous products of decomposing proteids, and it has been well established that the glands which furnish the secretions for digestion are among those frequently affected. Professor Chittenden points out very clearly that the elimination of excessive amounts of these crystalline nitrogenous bodies through the kidneys places upon these organs an unnecessary burden which is liable to endanger their integrity and may result in serious injury and early impairment of function.

With these facts before him Professor Chittenden thought it wise to ignore the suggestions made by Mr. Fletcher as to the importance of excessive mastication, because he did not wish to have too many factors to complicate his experiments. The sole object in Professor Chittenden's work was, by observations covering a long period of time and made upon different groups of men, to establish if possible a correct standard of food for the human race. It is probable, however, that the interest which had been aroused by Mr. Fletcher did lead during these experiments to much greater care in the mastication of food than is ordinarily

used at our tables under the circumstances that usually surround us. I may say at once that in all the diets of the different groups of men experimented upon there was no attempt at restricting the kind of food. Everything imaginable entered into their bills of fare—they had coffee and sugar and fruit and cereals and starchy foods and meats, and everything that one could possibly suggest. In fact, everything was done to avoid monotony of diet. In all cases the reduction of their food was gradual, but in all cases the appetite was fully satisfied. There was of course a tendency to reduce the quantity of meat and eggs taken, because in that way it was easier to cut down the proteids, but the diet was by no means a vegetable one.

I can only make a brief reference to these experiments, and go on to the conclusions which seem to have a direct bearing upon our work. The first experiment was with a group of five university professors and instructors, who took comparatively little exercise, but, on the other hand, were doing important brain work all the time. There was great variation in age and weight. In these five cases, during the period they were under observation, there was an average excretion of less than eight grams of nitrogen, and the fuel value averaged rather less than two thousand five hundred calories, while the body weight was maintained with slight variations, as was also the nitrogen equilibrium.

You will notice that the extent of proteid metabolism is accurately determined by the nitrogen found in the urine and feces. A proteid intake of one hundred and eighteen grams would require an excretion of sixteen grams of nitrogen. You will readily see that rather less than one-half the amount of proteid food indicated by the Voit standard was taken, while at the same time the carbohydrates were not increased. A nitrogen equilibrium briefly means that the nitrogenous food eaten should equal the amount of nitrogen excreted. If the nitrogen excreted is greater than the amount taken into the system it would mean that the tissues were being unduly drained, but if, on the other hand, the excretion is less than the intake it may be assumed that the system is storing up nitrogen.

These five men during the period of from six to eight months' experimentation expressed themselves as feeling unusually well and as having increased capacity for work, and at the end of the

experiment they were unwilling to go back to their former dietary. It was impossible, as it was with the other groups of men which I will speak of later, to determine whether their power of resistance to disease was lowered by this diet, because unfortunately they all remained in perfect health. It therefore seems that Professor Chittenden has successfully demonstrated that a professional man may practice a physiological economy in proteid food equal to at least one-half the amount called for by the usually accepted dietary standards. As a matter of practice the Voit and similar dietary standards answer pretty closely to the amount which the average man consumes. From the reduction mentioned we may reasonably expect improvement and not impairment in health, with greater capacity for work, greater resistance to fatigue, and probably to disease also.

The next group of men consisted of a detachment of thirteen from the United States Army Hospital Corps, and in their selection particular attention was paid to getting as great a variety of types as possible. In age they ranged from twenty-one to forty-three, and they weighed from fifty-two to seventy-one kilos. They were showing at the beginning of the experiment an excretion of nitrogen equal to sixteen grams, indicating that they had been averaging an amount of proteid food at least equal to the Voit standard. During the six months following they were doing daily work in the gymnasium, and besides this they had daily drill, setting-up exercises, and other light tasks; that is to say, they were in vigorous exercise. At the end of the six months' period they were eating less than one-half the nitrogenous food called for by the usual standard, with a fuel value considerably less than the three thousand calories supposed to be necessary. These men were in better physical and mental condition in every way than at the beginning of the experiments. Admitting all the benefits that were derived from gymnasium work and a regular life, no one can doubt that their mental and physical improvement was due in some measure to the cutting-down of nitrogenous food.

It is also shown by these experiments that the fuel value of accepted standards is probably higher than it need be. It is, however, easier to maintain the nitrogen equilibrium if the fuel value is kept up to a reasonably high point. For the following reason I spoke in the beginning of proteids as tissue-builders and

carbohydrates as energy producers, furnishing the fuel for the body. If the carbohydrates fall below the necessary requirements the proteids will be called upon to furnish heat, and the cells will therefore be called upon to give up some of their nitrogen.

The next group to be experimented with consisted of eight university athletes. These were men, unlike the soldiers, in fine bodily condition, and they were exercising their brains in their studies. They were in training and were taking an enormous amount of proteid food, since it is one of the old beliefs that athletes must be fed on a rich meat diet, and some of them were taking proteids far in excess of the Voit standard. It might naturally be expected that these men would be intelligently interested in the experiments, and would give their hearty cooperation to Professor Chittenden and his work, and this proved to be the case. At the conclusion of the experiment they were excreting an average of 8.81 grams of nitrogen, corresponding to fifty-five grams of proteid metabolized, instead of double the amount, which they were taking when the tests were begun. Although they all had been in training for some time before the beginning of the tests, and were supposed to be in perfect physical condition, every man showed improvement in his muscular power in his ability to perform athletic feats. One man gained two championships and another won points in track athletics for the first time, on this restricted diet. Boils and indigestion, so common to the ordinary athlete in training, were unknown, and the capacity for mental work was well maintained.

From these experiments it is fair to deduce that a man either in athletic training or leading a professional life may with safety and, allowing for personal idiosyncrasies, with marked benefit reduce his nitrogenous food to one-half the amount which he usually takes. Aside from the money-saving, which is a matter of domestic economy of great importance, but not within the scope of this talk, the economy to the body in not having to care for and dispose of an unnecessary amount of food must be very great.

In nearly all the cases upon which Professor Chittenden experimented the amount of uric acid was greatly diminished. This has a direct and exceedingly important bearing upon our treatment of pyorrhea alveolaris, and I am sorry there is not time to discuss that aspect of the question. To us, as dentists, it is enough to know that faulty metabolism leads to disease. Waste

proteid matter creates injurious products of decomposition which, taken up by the blood, are liable to produce deleterious effects upon all the tissues, including the brain and nerve-centers.

Those of us who wish to take advantage of the benefits to be derived from a reduction in the proteid food we eat, and wish to utilize this knowledge for the benefit of our patients, find ourselves deprived of the wise supervision of such a man as Professor Chittenden, and must look elsewhere for a guide to lead us to this desirable end. Such a guide we may discover in the proper mastication of all food and in reasonable common sense. It must be remembered that all changes in established habits must be made slowly, and that no departure from a generous and varied diet is at all necessary. Overconsumption of food generally comes from rapid eating. It is exceedingly difficult to eat too much if the meal be eaten slowly and each mouthful of food be thoroughly masticated. The appetite is satisfied before the danger point is reached. It is well-nigh impossible to eat any considerable amount of very rich or highly spiced or indigestible food if you thoroughly masticate each mouthful. Try it with any rich food and see how few mouthfuls will satisfy your appetite if they are eaten slowly, carefully masticated, and incorporated with the saliva.

(1) Thorough mastication invariably leads to the desire for simple foods. (2) Mastication promotes the flow of saliva and accomplishes much in the digestion of starchy foods. We had grown into the habit of thinking that salivary digestion accomplished but little, and until the recent work of Dr. Cannon, of the Harvard Medical School, I think physiologists were somewhat inclined to take this view. About the time that these experiments were being carried on by Professor Chittenden, Dr. Cannon was conducting a series of experiments which seem to throw additional light on one phase of the subject which had not been embraced in Professor Chittenden's work. Dr. Cannon mixed with the food of cats subnitrate of bismuth, and then proceeded to study the processes of digestion with the assistance of the X-ray, the bismuth making a very satisfactory picture on the fluorescent screen. His methods are most ingenious and his work most accurate and valuable.

We have long been accustomed to think that if starchy food escaped digestion in the mouth there were fluids that it would encounter in the intestines which would do the work of digestion.

Indeed, it was felt that salivary digestion could not amount to much, because it was erroneously thought to be checked by the acid juices of the stomach. Dr. Cannon showed that while the pyloric end of the stomach had marked peristaltic movement, the cardiac end did not move in this manner. He also found that food particles taken into the stomach remained sometimes for as long a period as an hour and a half in the cardiac portion of the stomach before they became mixed with the acid digestive fluids. It was demonstrated that if food by mastication was thoroughly mixed with the saliva, the salivary digestion thus begun would continue for as long a period as one hour and a half at least after the food had been swallowed, and the vital importance of mastication of starchy foods was established.

Besides the digestion of starchy foods (3) mastication comminutes the proteid food so that it presents a larger surface to be acted upon by the gastric juices, and relieves the stomach of unnecessary and exhausting labor. (4) It also reduces the danger of ulcers and carcinoma of the stomach to a minimum. Cannon has pointed out that ulcers of the stomach and carcinoma, which occur at the pyloric end, that end being known as the ulcer region, are caused by the rubbing over the delicate mucous membrane of that portion of the stomach of unmasticated lumps of food. They are forced down against the pyloric valve by this peristaltic motion, and then, as the intestine refuses to accept the food in such condition, are thrown back by the closing of the valve, and are rubbed backward and forward until ulceration and, in some cases, carcinoma result. At about the same time or perhaps slightly previous to this the medical profession, especially the surgical side of it, had begun to associate ulcers of the stomach with poor teeth, and to-day the medical profession is by its clinical observation ready to confirm Dr. Cannon's deduction that unmasticated portions of food produce these lesions at the pyloric end of the stomach.

I pointed out to this society on a previous occasion the fact that thorough mastication is the best preservative of teeth against carious action, and I will say further that I have rarely seen an instance of general and rapid carious action in the mouth of an individual who ate slowly and thoroughly masticated his food. Whether this results from the surface polish given to the teeth, or from the brushing off of the bacteria, which are destroyed by the

acids of the stomach, or from improved mouth secretions as a result of the healthy stimulus given to the glands, or whether it may be due to an increase in the resistant power of the teeth themselves, the result is the same—(5) mastication prevents decay.

(6) Mastication also prevents disease. I do not speak now of the diseases of the stomach which have their origin in nervous haste or in taxing the stomach with large quantities of unprepared food, but of diseases of specific bacterial origin. We know that nearly all bacteria which produce disease find their entrance into the body by way of the mouth. I pointed out in a previous paper that pathogenic organisms resting in unclean mouths not only multiply rapidly, but have their virulence increased, and I referred to the pneumococcus as one especially influenced by environment. It seems a far cry from mastication to pneumonia, but it is probably true that the destruction of bacteria by the acid secretions of the stomach goes far to limit disease. This was ably demonstrated by Koch many years ago in the study of the cholera bacillus, and it has been shown since that prolonged mastication, particularly of hard substances, goes far to free the mouth of bacteria. They are most numerous in the mouth before eating and fewest just after a meal, and the thorough cleansing of the mouth by vigorous mastication must assist in the removal of pathogenic germs.

Added to this is the fact that bacteria do not pass through healthy epithelial tissue, but irritated, inflamed, or diseased epithelial tissue lends itself readily to their passage, and this latter condition of the alimentary tract may easily be brought about by improper feeding.

(7) The exercise of mastication, besides producing healthy glandular secretions, insures an active and healthy circulation of blood through the tissues of mouth and adjacent parts. It promotes the flow of lymph and secures the healthy nutrition of the teeth themselves. If this be so in adult life, what must it mean in childhood? The development of the bones of the face and of the teeth, the development of the muscles, and the health of the soft tissues must be greatly affected by the influence which exercise or its lack affords. There are many serious students of this subject who believe that contracted jaws and accompanying irregularities, adenoid growths and other diseases of the soft tissues, as well as

weakness of the teeth themselves, are largely due to the lack of mastication which our present method of feeding children involves.

I think I have said enough to demonstrate the importance of mastication, but it is interesting to see how from different points of view the same conclusions may be arrived at. In the first place was Mr. Fletcher, who insisted on excessive mastication, and thought that because of excessive mastication smaller amounts of food were needed; then Professor Chittenden, who has demonstrated without particular attention being given to mastication, that smaller amounts of food are required than we had supposed; then Dr. Cannon's excellent work, showing the danger from another point of view of swallowing unmasticated food, and the possibilities of salivary digestion if the food was thoroughly masticated, and then the clinical evidence provided by the medical profession of the results of bolting our food.

In conclusion, I think it will be admitted that in the conservation of the organs of mastication we as dentists have a life work second in importance to no other, and as these truths which I have brought to your attention become more and more recognized the respect and admiration of the world for our profession will be greater than ever before. It is by the conscientious study of these problems that we make ourselves worthy of the respect and confidence which the public reposes in us.—*International.*

DIET IN HEALTH AND DISEASE. By A. B. Spach, A. M., M. D., Chicago. Read before the Chicago Odontographic Society. I know a man, and knew him when he was a child, who whenever he partook of egg or any food prepared with egg became violently ill. I have seen him writhe in agony many times from eating a light dessert where egg was incorporated in its preparation. His parents thought for a long time that it was only a notion on his part, but oft-repeated experiences, many of which were excruciatingly painful and sometimes fraught with alarm, caused him eventually to desist from eating at all of egg or any food prepared with egg. What is there peculiar to the egg, or unusual in this individual, that brings about this lack of harmony or lack of comfortable well-being whenever egg is eaten? I have a baby under my care who is now a little over a year old, and

who whenever he takes milk, no matter how carefully modified or prepared, becomes restless and irritable and refuses to thrive. We know that one person is poisoned by a dose of belladonna or morphin which would be beneficial to another. I once administered ⅛ grain of morphin guarded by 1-150 grain of atropin, hypodermically, and in a few minutes heard the patient call out in agony that she was going to die, and for a period of over three hours I anxiously thought the same.

All individuals have their resemblances and differences, and now it seems that the province of chemistry and physiological chemistry is to recognize them and differentiate them. We have come to know that there is a chemical distinction and a chemical characteristic in the animal organism, and that these have a marked bearing upon the application of diet in health and diet in disease as well as upon other methods of the healing art. Characteristics and peculiarities were formerly and are sometimes yet explained on the ground of idiosyncrasy, that is, peculiar to the individual, and we have said and say yet, what is one man's food is another's poison. In adapting a diet in health and a diet in derangement of function we are compelled to rely upon experience, the chemistry and physiology of digestion, and a knowledge of the chemistry of foods. It no longer suffices for a physician to tell the patient to be careful of his diet. A lady brought her little boy, aged thirteen years, who was apparently suffering from some form of dyspepsia, to me recently. She began by telling me that she had been very careful of the lad's food, but upon investigation it was clear to me and is now to the mother that she had been starving him. Abstention from food, although eminently proper under some circumstances, does not constitute a regulation of the diet, when it results in the starvation of the patient.

In health the individual should obtain his necessary daily 125 grams of proteid, 500 of carbohydrate and 50 of fat. These represent about 3,000 calories of heat units. Now a calorie is the amount of heat required to raise one liter of water 1 degree C., or, what is the same, one pound of water 4 degrees F. These 3,000 units of heat can be obtained from one pound of bread, one-half pound of meat, one-fourth pound of fat, plus one pound of potatoes, one-half pint of milk, one-fourth pound of eggs, one-eighth pound of cheese. If we divide these foods up into meals we can have for

breakfast: Two slices of bread and butter, two eggs. Dinner: One plateful of potato soup, a large helping of meat with some fat, four medium-sized potatoes, one slice of bread and butter. Supper: Three or four slices of bread and butter, one glass of milk, two ounces of cheese. This arrangement can be varied, as, for instance, one-half the meat and potatoes as well as half the cheese may be taken at the noon meal and the other halves at the evening meal. Fruits can be partaken of as dessert. Such a diet will suit the ordinary individual in health doing average work.

A few years ago while in a café at noontime I saw a young woman, evidently a clerk or stenographer, come in and sit down at a table nearby. She ordered for her lunch a piece of pie and a cup of coffee, which constituted her entire meal. Her breakfast, in all likelihood, consisted of a piece of toast and a cup of coffee or tea, with perhaps an orange. The evening meal might have been more, with some meat. From my observation of this class, however, extending over a period of a number of years, a diet of this character is a common thing. The number of calories, perhaps a thousand, is barely enough to keep soul and body together, and this is what may truly be termed a starvation diet. Consequently, we are not surprised to learn that these unfortunate individuals sooner or later develop tuberculosis or some other disease which soon terminates their starved-out existence.

I had the opportunity a few years ago of seeing a man of seventy-three years eat for his morning meal four to six eggs, a large piece of ham, large quantities of bread and butter, potatoes, coffee, etc. For his noon meal, a large piece of roast meat, large quantities of bread and butter, potatoes, coffee and dessert. For his dinner at night a large plateful of soup, large quantities of meat of one or two varieties, and accessories proportionately large. This is what you would call the diet of a glutton, and the calories approximately would average 8,000 to 9,000 every day. This man has kept up this method of feeding all his life and maintained a fair degree of health, as well as having succeeded moderately in his business undertakings. It is difficult to say, but we might conjecture what he might have accomplished had he subsisted upon a diet of moderation.

Much has been said and written upon the subject of vegetarianism, or a diet exclusively of vegetables. Herbert Spencer, I think it

was, having lived for six months upon this diet, threw everything he had written during this period into the fire. It is argued that the chemical constituents of vegetable food are equal in nutritive value to the corresponding constituents of animal food, and that therefore vegetable food as a whole can replace meat. The question in truth is one of nitrogen and that alone. The carbohydrates are practically entirely derived from the vegetable kingdom; proteid and fat are also obtained from vegetables.

100 parts of dried lean beef contain..89 parts of proteid
100 parts of fat beef contain.....51 parts of proteid
100 parts of pea flour contain.....27 parts of proteid
100 parts of wheat flour contain.....10 parts of proteid
100 parts of rice flour contain..... 7 parts of proteid

When we consider how incomplete the absorption of vegetable food is, and also the enormous quantities of vegetable food that must be consumed to yield the necessary nitrogen, we see how futile and even hazardous it is to live exclusively upon an entirely vegetable diet. A dentist in my neighborhood attempted this diet, and he was a man who bore a reputation for skill in his profession. He is reported to have made many a meal upon watermelon. The average composition of watermelon is, water, 92.9; proteid, 0.3, and carbohydrate, 6.5. From this analysis it is readily seen how low in nutritive value the watermelon is and the enormous quantities that must be eaten in order that the organism receive the proper amount of nitrogen, and the same may be said of other vegetable foods. He failed to understand that the strongest force to fight disease is good nutrition, and good nutrition is maintained only through good food. He died last winter from tuberculosis.

The raw food mania prevails somewhat in the country, and we find people who are said to eat raw wheat, rice, oats, potatoes, meat, etc. Some freak like Dowie or Mrs. Eddy had a dream that raw food is the thing and nature's only way, tried it upon himself and thought he found it good, and induced others to do the same. Those of you who have ever seen a flock of sheep know that if you place a pole lengthwise in front of the bell-wether or leader he will jump over it if driven, and the sheep immediately following will do the same. Withdraw the pole and every last sheep of the flock will jump over an imaginary pole at a point just where the pole was placed originally for the leader.

In the adaptation of food in disease the science of chemistry and physiological chemistry has come to our aid. The individual peculiarities of the patient, his power to digest food, and kinds of food and his physiology of digestion are carefully studied. The stomach contents and fecal discharges, and likewise the urine, are scrutinized chemically and microscopically. After a thorough history of the case and a careful physical examination resort is had to a special test—that of Ewald, which consists of 35 to 70 grams of plain bread, and 300 to 400 cc. of water or weak tea. The contents of the stomach are withdrawn one hour later, filtered and titrated with a decinormal solution of sodium hydrate. We are enabled to determine whether we have an excess or lack of hydrochloric acid, also the presence of organic acids, and are thus enabled to determine what bearing their presence has upon the diagnosis and prognosis of the case, and finally, what relation they may sustain in the adaptation of a diet, that the patient may be sustained and restored to health, and at the same time maintain a state of comfort and well being in the organs of digestion. It is evident then, that there is no Procrustean bedstead in the application of diet as a therapeutic measure.

It is also evident, for example, that a diet in which there is an excess of HCl should differ markedly from one in which there is deficiency or total absence. Our therapeutic measures would likewise differ markedly in both cases. The regulation of the diet is strikingly seen in cases of hyperacidity of the stomach (hyperchlorhydria) where albuminous food is administered, that it may combine with the excess of hydrochloric acid in the stomach just at a time when, if it should remain there free, it would set up an irritation of the nerves of the gastric mucosa and reflexly cause a symptom of complex or nerve exhaustion or neurasthenia. A lady of sixty years, with an acidity of 80 degrees, thought she would lose her mind. She had been treated much by many physicians, but a diet suited to the condition resulted in a rapid disappearance of all the uncomfortable symptoms. Fully as striking results are seen oftentimes in the correction of the opposite condition.

In the preparation of foods there is only one place, and that is in the kitchen and in the home. There is not a prepared food on the market that cannot be duplicated in palatability and nutritive

value and at a far less cost in the home. Much spoiled grain, it is said, enters into the composition of many of the cereal foods, and the temptation to perpetrate fraud is just as great here as in any other field of human activity. Recent investigations have disclosed an appalling condition that menaces the health of the nation, and that is in the extensive adulteration of food products, as there seems scarcely a one that has escaped. A cause of the much-talked-of race suicide can be found here. It is estimated, and perhaps within the limits of truth, that 500,000 infants die in this country every year through consumption of adulterated or unfit foods. The subject is one that comes home to us all, but requires a more extended treatment than can be included within the limits of this paper.

It is my observation, extending over a period of many years, that where we find delayed dentition in infants, or defective dentition, it is due to a deficiency in proteids. Bottle-fed babies who have been given for a considerable period some of the cereal or patent foods, or condensed milk in which large quantities of cane sugar predominate, are very prone to exhibit trouble in the eruption of their temporary teeth. Unless this defect in nutrition is corrected defective dentition is apt to extend over into the second period, or the eruption of the permanent teeth. In brief, it is proteid starvation.

Now, as to a mixed diet. Experience and extensive scientific observation go to prove that a mixed diet—that is, one of animal and vegetable food—is best suited to the human stomach and organism. A vegetable diet alone is disastrous, but a non-meat diet (Haig's) can be arranged like this: Ten ounces of bread, two ounces of oatmeal, two to three pints of milk, two and a half ounces of cheese, one ounce of nuts, two ounces of butter, eighteen ounces of fruit and vegetables. This yields 2,500 to 2,800 calories and is well sustaining. I have maintained patients on this diet for years, and they have thrived and done their work as well as those on a meat diet. This is a mixed diet and contains animal food, and contains an ample amount of animal proteid that is digestible and easily assimilated. Some people who suffer from headaches or some from so-called chronic rheumatism maintain good health and a comfortable well being on this diet. In truth, they know well that they dare not attempt any other diet for any considerable length of time. Whether it is uric acid or what in the meat I know

not. Faulty premises necessitating faulty deductions have put us somewhat at sea as to what role uric acid plays in the causation of disease. With a sound pathology, physiological chemistry undoubtedly in the near future will shed light on this and many other unsolved problems as to diet in health and in disease.

Physicians and dentists to be scientific must be physiological chemists, and must be thoroughly grounded in a sound pathology. They should always be seekers after the truth, the real science, and not follow blindly with a sheep's intellect what some person has dreamed or imagined. They cannot then become faddists and will not then follow after false gods into the pseudo-scientific, the visionary or the chimerical.—*Review.*

CIVILIZATION AS A FACTOR IN THE ATROPHY AND DISAPPEARANCE OF THE THIRD MOLAR. By Dr. Juan Falero, City of Mexico. Read before the Fourth International Dental Congress, St. Louis, September 1, 1904. If any change whatever in the functions of an organ be sufficient to excite the attention of thinking men and induce them to undertake investigations as to the causes of that change, with much greater reason should they study the disappearance of an organ, however insignificant it may appear.

I am alluding to the disappearance of the third molar, the presence of which has up to the present been considered permanent in spite of the fact that our daily observation proves the contrary. This molar was never wanting in the primitive races; at least it is so asserted by all authors who have studied the matter, and the skulls of the ancient Egyptians as well as those that are preserved in the different museums of Europe prove the existence of this organ in all adults who have passed the age of twenty-five years.

We who live in Mexico find ourselves in a specially favorable condition to observe a change that is taking place in our organism, and to which I desire to call attention. I say that we are in specially favorable surroundings, because here we have before our eyes an Indian race in all its purity, whose magnificent teeth we can admire and compare with those of their descendants of mixed race and with those of the natives of Europe who reside among us.

In the magnificent collection of ancient skulls that is to be found in our National Museum I have seen this molar in all developed jaws, and in more than 2,000 mouths of Indians whom I have ex-

amined in the states of Yucatan, Campeche, Tobasco, Chiapas, Vera Cruz, Oaxaca and Puebla I found only one in which this tooth was not fully developed. With the single exception noted I found the third molar in good condition, and neither badly formed nor out of place, as frequently happens among ourselves.

Among the Europeans or their descendants whom we daily attend in the work of our offices hardly seventy-five per cent possess these molars, and it is noted that when they have these teeth they are seldom in good condition. They rarely have the four—the natural number—while many have only two, generally the lower ones.

In view of this deficiency or omission it occurs to me to ask whether it is not to be attributed to our way of living and to the slight use we make of our teeth. It is well known that the Indian seldom makes use of condiments to flavor his food, that this food is always the same—being very simple, rather cold than hot—and that he uses no further appliances than his own teeth and jaws. In fact, his teeth are for him real knives, with which he cuts meat, peels sugar-cane, cuts string, or picks bones; of his molars we can say that they are true mills which pulverize everything that comes within their reach. In addition to this function the Indian makes use of his jaws as if they were a third hand; he employs them to hold the reins of his horse, to support his clothing and arms while fording rivers, to graduate the weight of a load by lifting it first with his teeth, and so throughout the whole round of occupations. We can easily understand that such exercise is conducive to great development of his jaws, in which the teeth are well rooted and have sufficient space for their full and free development.

If we accept as a scientific truth that the functions fulfilled by any organs—that is to say their exercise—develop and strengthen them, while the want of exercise debilitates and atrophies them, we find an eloquent argument for this theory in the teeth. It is a fact that our teeth are far from executing the work for which nature has designed them. Our food is brought to the table in a soft state, due to the cooking to which it is previously subjected and to the division we make of it with a knife; the teeth therefore really fulfill a secondary office. This want of exercise appears to me to be the determining cause of the atrophy of our molars and jaws, and, consequently, of the lack of space to allow the development of the third molar.

If to this we add that the Indian is naturally sober, is beyond the great emotions connected with civilized life, leads a tranquil life, retires early, does not smoke, is exempt from syphilis, we may consider all these circumstances favorable to the prevention of that debilitation of the organism so often found in civilized races. These factors constitute proof, further, that customs and habits exercise great influence in the development and preservation of the teeth. During the existence of slavery in Cuba the African negroes employed on the plantations were exceedingly muscular, and although treated like animals were otherwise obliged to lead a quiet and methodical life, and consequently never suffered from caries. Now, however, they lead a civilized life, especially in the cities—they have lost their vigor, most of them are victims of syphilis, and their teeth, which formerly could be taken as models of texture and beauty, now suffer from caries just as much as those of civilized persons.

I therefore come to the following conclusions: (1) The third molar is always found in the Indian at the age of twenty years in as well developed a condition as any of the other teeth, and it makes its appearance as an entirely physiological act without any difficulty whatever.

(2) The third molar is also invariably found in the halfbreeds, but it does not appear as early as in the Indian, often not before the age of twenty-five years. Moreover, its eruption does not take place in a normal manner as in the Indian, since it is frequently accompanied by more or less intense inflammation due to the effort made by the tooth to occupy its proper place in the jaw.

(3) The third molar is an organ that is not invariably found in Europeans or their descendants, as it is possessed by only seventy-five per cent of them, and then in a defective form and more or less out of place, while its duration is shorter than in the races above mentioned. As in the Indian and halfbreed, this tooth commences to erupt at the age of eighteen, but with Europeans and their descendants it does not complete its development before the age of thirty. In the latter case the eruption is often accompanied by facial neuralgia, inflammation, abscess, and fever, all which disorders are caused by want of space in the jaw and pressure of the organ on the tissues in its endeavor to occupy its proper place. This want of space is at times so evident that the extraction of the second molar becomes necessary, and cases have been known in which the third

molar has remained buried within the jaw on account of the entire want of space within which it could appear.

I have never seen in an Indian a case of trismus, or any other complication whatever that could be attributed to any difficulty in the eruption of the third molar, while in Europeans disorders accompanying its eruption are frequent and sometimes assume a serious character. If, therefore, the same case assumes such distinct characteristics according to the origin of the person, to what must we attribute this difference, if not to the enervating influence of civilization?—*Cosmos.*

DESENSITIZING THE TOOTH-PULP BY WAY OF THE DENTINAL TUBULES. By J. Edw. Line, D.D.S., Rochester, N. Y. Read before the VIIth District Dental Society. The discovery by Spooner that arsenious acid would destroy the tooth-pulp was an epoch-making bit of work in the history of dentistry, and was quickly followed by the application of this agent as an obtundent of sensitive dentin, whether for that purpose merely, as we use silver nitrate to-day, or as a part of the preparation of cavities of decay for the further operation of filling. The later discovery that its action had no limitation short of the destruction of the pulp led forthwith to its discontinuance, except as it is used at the present time and for the same purpose. It may be of interest to note that the man chiefly responsible for its widespread use as an obtundent was among the first to cry out against further misuse of an otherwise invaluable adjunct to the dental armamentarium. He frankly admitted his error, shouldered his full share of the responsibility, which was great, and used every means within his power, whether of tongue or pen (for he spoke and wrote much and often), to stop those given to the practice and dissuade those ready to begin.

Good at Times.—Medicaments that merely anesthetize the terminal ends of the dental fibrils have long played an important part in cavity preparation, and even to-day there are men who pin their faith to and cinch their practice by using chloroform, ether, or one or more of the essential oils, singly or combined, as obtundents of sensitive dentin—and with good reason. Medicaments that destroy, but only very superficially, still have a place in our cabinets; chlorid of zinc is perhaps the best representative and the one most

generally used. Medicaments that dessicate—that dry—that rob the fibrils of their water—have been and are now occasionally made use of to good advantage. Alcohol of high grade and glycerin in its purest form rate high because of their exceptional greed for water. Heat by means of the directly-applied hot burnisher; a jet of air; hot solutions unaided, or solutions driven home by the heated burnisher or heated air, add materially to the list. The application of cold, or rather the abstraction of heat, by means of ether or rhigolene spray held sway for a spell, only to be dropped because of the small margin for choice between the suffering of the disease and that caused in the attempt at cure.

Cocain.—To-day, while these have not been wholly displaced, all resort to that best of all-round local anesthetics (analgesics?), cocain, or combinations of which it is of necessity the essential ingredient. Applied in aqueous solution it has some effect both on dentin and on the pulp; aided by pressure, continuous or intermittent, as in percussion, it goes to the depths. The same may be truthfully asserted of cocain and its combinations, only to an immeasurably greater degree, when influenced or reinforced by the electric current. Cocain has held its place from the first, the medicament seemingly the most desired and needed; but methods and appliances have only recently extended its field of usefulness and made its effects more certain and speedy of attainment.

By Way of the Nose.—A method at once unique, and by those who have resorted to it pronounced very effective, is that first suggested by LaCrone as possibly of value to the dentist, and advocated in certain cases by Low. It calls for the introduction into the nose anteriorly of a pledget of cotton saturated with a solution whose chief ingredients are cocain and adrenalin. This combination affects the nerve supply of the anterior teeth, sometimes the first bicuspids, more rarely the second, and, let us remember, not through the tubules of dentin, but through the nerves to the apical foramina and possibly through those of the substance of the pulp itself. It seems not to have become popular, and the chief reason for this may be charged to the necessity on the part of the patient of having with him for the succeeding twenty-four hours a pocket mirror to reassure himself from time to time that his nose and upper lip are still on.

High-Pressure Methods.—With some, however, all of these

methods have become obsolete, and resort is had to the method that involves the use of a powerful syringe for forcing cocain or its equivalent into and through the dentinal tubules. Like syringes generally those that apply here have as an essential part of their make-up a piston or plunger operated by direct pressure, as in the U. S.; the screw, as in the Sapp; the lever, as in the Myers and the Wilcox. Whether for the work of painless cavity preparation or the removal of the pulp the nozzle is implanted in dentin. To this end a pit must be made in the dentinal tissue, which is easily and quickly done in a cavity of decay, or on eroded or abraded surfaces from which the enamel has been removed. Otherwise the enamel must be perforated and the beginning of this canal countersunk, to provide for accidental lateral movement on the part of the rigid nozzle—a valuable bit of practice brought it to the attention of the profession early in the history of the method. Without this provision flaking or even deep fracture of the enamel may occur, to say nothing of the disagreeable wrenching of the tooth because of the fixing of the appliance when the nozzle is inserted into a deep pit. The whole instrument becomes for the time a powerful and correspondingly dangerous lever. With these preparations and precautions the work consists of forcing into and through the dentinal tubules as much as possible of the contents of the syringe.

The Depth of the Pit.—It becomes a question of some interest as to the depth to which the pit should be carried. In a cavity of decay it would seem that the deepest part, giving as it does the nearest approach to the pulp, would afford the best, because the shortest route to that organ, but in superficial decay, covering much surface and calling for extensive cutting, the number of tubuli included by the nozzle would leave a large zone unaffected. Here two or more injections might be indulged in, but it would seem as if the same or a better result might be effected by limiting the depth of the pit to the granular layer—that partially or loosely calcified layer that marks the dividing line between dentin and its covering tissues. Laboratory experiments show a wide spread of the injecting solution in this layer, and a greater number of tubules affected—a number proportionately large to the affected part of the layer in question. Theoretically, at least, the greater the number of tubules carrying the solution pulpwards the greater the surface

desensitized. This inferential advantage is offset somewhat by the fact that, while but few tubules are included in the nozzle of the syringe, the solution driven through them to the pulp is distributed over a considerable surface of the pulp itself, anesthetizing more or less completely the whole district supplied by fibrils radiating from the affected pulp surface.

Success and Failure.—The inventor of one of the instruments in question reported some time since over one hundred cases without a single failure. These included cavity preparation, pulp extirpation and decrowning. Some of the last-named might not have given any pain if this or any other means of desensitizing had not been employed. To illustrate: Having two central incisors to crown I notched them labio-lingually with a suitable wheel, thinking meanwhile in case they proved sensitive to resort to the desensitizing method under consideration. As there was no suggestion of pain on the part of the patient, a lady of about twenty, I clipped them both with a forcep, then cautiously inserted a broach into the pulp cavity of one, making it hug the wall, passed it to the end of the root, gave it a turn, and laid the broach with its pulp on the table. In an equally undemonstrative way I repeated the operation on the other pulp with a like result. While engaged for the moment winding cotton on a pair of dressing broaches the patient, examining the display on the table, asked, "Are those the nerves?" "Yes." "And everybody told me it would hurt!" This is an exceptional case, and yet had I injected the teeth two grand successes would have been duly recorded.

Notwithstanding the great success that comes to some men, failure, partial or complete, now and then comes to others. Wishing to decrown a lateral incisor I drilled a pit in the enamel of the mesial surface about one-third the length of the crown from the incisive edge, and, to make doubly sure, another in a shallow, cervical cavity on the same surface. Decrowning and pulp-extirpation were accompanied by pain, the quality of which was beyond compare, and the quantity sufficient to entangle him for a time in words sometimes used in prayer. Why this unlooked-for result? This patient was forty-five to fifty years of age, and his teeth were of exceptional quality, all of them bearing the marks of vigorous use. His age, coupled with the fact that the teeth showed much wear across the incisive edge, suggested calcified dentin, or rather filled-in

or obliterated tubules, of course impervious to the solution. Opposite the cavity of decay I found a deposit on the pulp-cavity wall, and when it is called to mind that the tubules in these deposits are offset rather than continuous with those of the normally-developed dentin, we have good and sufficient reasons for the failure.

The better plan in these cases would be to open through a normal district, avoiding all places suggesting abnormal calcification and secondary deposits. This and similar cases tell us unmistakably that attempts at injection of completely calcified dentin, or where there are secondary deposits, should not be made. This kind of dentin, or dentin in this condition, is found in the aged and can be accounted for by age alone. It is also found in teeth long subject to abrasion; in teeth affected by erosion, and especially in those in which the erosive action intermits or has received a permanent check; in cavities of slow growth; between the ebony-color line and the pulp-chamber. Failure should also follow in cases of secondary deposits on the wall of the pulp-cavity opposite the cavity of decay, as in the case of the patient just mentioned, and should follow in case of a pulp-stone that becomes adherent to the pulp-cavity wall.

Exposed Pulps and Large Foramina.—Success in this operation is modified or unattained in two other classes of cases. The first, that of exposed pulps; the greater the exposure the more likely the failure. Here the solution passes to the pulp and, following the line of least resistance, flows to and through the opening of the pulp-cavity into the cavity of decay. It is not held in place long enough to penetrate the tissues, and not long enough in extensive exposures to appreciably affect the most superficial portions. Many of this class may be made successes provided the exposure is simple, easily reached, and covered with cement before the injection is begun. In the second class of these cases we have similar conditions, but due to widely different causes. In the large apical foramina of undeveloped teeth of children, and the foramina of the adult when these are naturally but abnormally large, or made so from whatever cause, it is impossible to force the solution in any other direction than the apex, where it must lie until disposed of by the comparatively slow-acting circulatory fluids.

Whither the Solution.—What becomes of the cocain is already a matter of investigation in other quarters. In the case of exposed

pulps it escapes largely into the cavity of decay. In cases of abnormally large apical foramina it trends toward the apical space, and beyond, to be gathered up as already stated. But without these outlets? Here it would seem, and laboratory experiments point that way, that it first gathers as a droplet, a sort of bleb, between the cavity wall and the pulp, eventually undergoing absorption by the vascular supply, and through this is eliminated from the pulp and finally from the system itself. That it does reach the very interior of the pulp is proved, first, by the absence of pain when a broach is forced into a recently injected and decrowned tooth; second, by the finding of cocain in the substance of the pulp itself. This latter calls for a tooth recently injected by way of the dentin, preferably in the mouth. The tooth is then extracted, notched as for decrowning, and placed near enough to the pipes of a cold storage box, or in ice and salt freezing mixture, to freeze or at least thoroughly chill it. Later the tooth is broken, the pulp showing a clean fracture, the whole quickly washed in running water, and a bit of the heart of the pulp placed in a drop of water on a slide and transferred to a bell-jar containing a piece of wet blotting paper. Under these circumstances evaporation of the water on the slide occurs slowly, with the result that we have cocain crystals in perfection. That they are such is further proved by the polariscope.

Torn and Displaced.—Another question that suggests itself is, What effect has this means of desensitizing the pulp on the soft structures of that organ, and especially the soft structures of the dentin? In laboratory experiments there is every appearance of the fibrils having been torn from their moorings, and therefore to that extent the pulp itself is lifted from its anchorages in the pulp-cavity wall. Whether harm comes of this to teeth treated for filling is still an open question, but it certainly is worth considering in young teeth where the apical foramina are necessarily large, the soft tissues in such openings offering but little resistance to the force exerted in driving the solution home. In other cases the detachment and breaking up of the soft tissues is probably of no consequence.

Mechanics or Chemistry?—To what is this desensitized condition of the pulp and its ramifications due? To the solvent, or to the cocain, or to both? The question comes because of the fact that similar—not the same—results have been obtained with water,

and with water holding in solution substances that have no anesthetic effect whatever. Distilled water and water containing sodium chlorid have been used in mucous, serous and cutaneous surface work and no pain was experienced, and mere gorging of the vessels and adjacent tissues seeming to answer the purpose for the time being, much as a string tied about the finger acts by cutting down the local circulation. The desensitizing here is evidently due to the mechanics involved, rather than to the chemistry of the injected fluid. Whatever the effects of the solvent, however, cocain or its equivalent is an essential in this kind of work, and except for mere experimental purposes for comparison the matter would be hardly worth more than mention. It merely shows what *can* be done.

Method Anticipated.—Finally, let all who have used cocain on a bur in excavating for filling, or for encroachment on the pulp with reference to extirpation, or on a wheel as a lubricant in cutting down stumps for crowning, take credit to themselves that they have anticipated the instruments now used for desensitizing purposes. To cut the ends of the tubules with a bur or grind with a wheel wet with cocain is to rub, squeeze, crowd, force into the tubules and their contents the desensitizing solution, and, as we lessen the distance between the instrument and the pulp cavity, into the pulp itself, so that when exposed the cornual end is partially and sometimes wholly desensitized. The conditions of success are that the surface shall be kept wet, that the bur or wheel shall be fine, and that its progress shall be comparatively slow, now and then to the turning of it backwards.—*Dent. Off. and Lab.*

MALPOSED TEETH A FACTOR IN FACIAL NEURALGIA. By Frederick Crosby Brush, D.D.S., New York. Read before the Bridgeport Dental Society, March 31, 1905. A close observation of cases of facial neuralgia leads me to believe that the malposition of teeth may induce a pathological or functional change in the surrounding tissues affording sufficient irritation to become manifested in the form of a neuralgia. Before entering further upon this subject let us consider what is meant by the terms neuralgia and malposition. In the last edition of the American Medical Dictionary neuralgia is described as "Pain in a nerve or in nerves, or radiating along the course of a nerve, a name

applied to pain which may result from any one or more of a great variety of morbid conditions." The term facial neuralgia "distinguishes the variety of the neuralgia according to the part affected." The same authority describes malposition as "an abnormal or anomalous position," that is, "a deviation from the natural order of normal standard." From these premises we may assume that a deviation from a normal standard may in a manner be considered a morbid condition. This being the case, malposed teeth and their accompanying condition should be considered as a possible factor when seeking the cause of a facial neuralgia.

The question of temperament enters largely into a consideration of these cases. Slight deviations from the normal, with their accompanying conditions, that might be unnoticed by phlegmatic patients, may be a sufficient irritant to those of the nervous type to become a source of annoyance and positive discomfort; while with the neurasthenic they may cause a severe neuralgic disturbance.

While many cases of malposed teeth unaccompanied by any neuralgic symptoms may be observed, yet when a neuralgic case presents for treatment, and all other possible causes have been eliminated or remedied without affording the desired relief, it would be well to consider carefully the positions of the teeth in the affected region and the amount of stress upon them, for it is possible that the correction of a malposition or the relieving of undue pressure may give relief and effect a cure. This will apply particularly to cases where teeth have deviated from their normal positions under occlusive stress, due to certain conditions, rather than to those where the teeth have erupted in malposition, although in some cases even this condition may be considered as a possible cause of irritation.

If an intermittent or continual pressure is exerted upon a tooth, tending to force it to assume an abnormal or an unnatural position, will not this position produce a slight strangulation of the blood-vessels at the apex and about the root sufficient to cause a congestion that will make a pressure upon the nerves of the surrounding parts?

In cases where the principal molars are missing, allowing the other teeth to shift their positions, thus shortening the bite, the second molars are practically compelled to receive and sustain the

occlusive force during mastication. This continual strain tends to force them into an abnormal position, thus causing a readjustment of all the tissues in that immediate region. While this condition alone may not be sufficient to originate the neuralgia the reflex pain may be centered or felt in this region if there is a nerve strain or irritation in some neighboring part.

Two cases came under my observation recently where the direct cause of the neuralgia could be attributed to eye-strain, while the reflex pain was manifested in the region of a malposed superior second molar that was undergoing an occlusive pressure which was tending to force it still further away from the normal. In these cases the correction of the position of the molar only will not produce a satisfactory result, but if this correction is accompanied with a relief of the eye-strain the direct cause and its accompanying reflex will be eliminated and a cure may reasonably be expected.

In another case the full import of the malposition of a left superior second molar and its possible effect upon surrounding tissues were not appreciated until a model had been obtained and studied, when it was found that, owing to the occlusion, the molar had become tipped forward and driven upward into the alveolus until it was considerably shorter than the adjoining teeth. It appeared quite possible that the buccal roots might be exerting a pressure upon the floor of the antrum, so a radiograph was taken to determine this point and as a further means of diagnosis. The radiograph showed that while this was not the case, as the floor of the antrum was high and not penetrated by the roots of any of the teeth, yet the position of the roots of the molar and the condition of the surrounding tissue were such as to be capable of causing considerable irritation. In this case an effort is now being made to restore this molar to an approximately normal position, hoping that it will afford a relief from a distressing intermittent neuralgia of many years standing.

A form of malposition not usually considered is where teeth have become crowded together owing to the loss of the proximate contours, generally due to caries and the faulty method of the filling operation in the treatment of the same. Such a condition of the teeth is conducive to a pathological condition of the surrounding tissues. The interdental space is normally occupied by a septum of

the alveolus and the soft tissue forming the festoon of the gum. This septum protects the proximate surfaces of the teeth by the particular function it performs in the process of mastication. When the soft tissue of the septum is normally shaped it forms two inclined planes upon which particles of food that have been forced between the teeth will slide out and again be within the reach of the tongue or the muscles of the lip or cheek. When the proximate contours are lost the forcing together of the teeth tends to make a pressure upon these tissues of the septum which may be enough to produce a congestion and inflammation that may result in either hypertrophy of the soft tissue or the destruction of the entire septum. Either of these conditions with its accompanying evils is in some cases a lesion sufficient to be manifested in a form of facial neuralgia.

This was particularly exemplified in one of my cases. The patient gave the following history: The teeth had required attention at an early age and had since been cared for regularly. Some time ago intermittent facial neuralgia developed, the attacks continuing with greater frequency and increasing severity. The physician consulted attributed the cause to some condition of the teeth. At this time the neuralgia was recurring at intervals of about ten days and frequently became so severe that it was necessary to resort to sedatives in order to obtain relief. The patient was an extremely sensitive, nervously organized woman, engaged in a literary pursuit to which she was devoting all her energy, and rapidly nearing a state of neurasthenia. The neuralgic pain was manifested in the superior maxillary region of the left side of the face and seemed to center along the posterior dental branch of the superior maxillary nerve. An examination of this region showed all the teeth present and having fillings on their proximate surfaces with the exception of the second bicuspid, which, having been broken, was restored by a banded crown. There were no new cavities nor any indication of recurrent caries. A close observation revealed that the proximate fillings had not restored the natural contour or form nor supplied a suitable knuckling point to the teeth, but had been finished with flat surfaces, thus allowing the teeth to crowd together and produce pressure upon the intervening septa. Also that the gingival borders of the fillings had not been finished flush with the tooth structure, but were rough and

uneven, making numerous irritating points. The band of the crown on the bicuspid did not fit the root tightly nor conform to its shape and had been forced considerably under the gum, evidently for the purpose of securing its retention. Needless to say, such a condition is always a source of irritation. The treatment of the case consisted of wedging the teeth apart until they occupied approximately their natural positions. The banded crown was replaced with a full porcelain one carved to conform to the shape of the root and the probable original form of the natural crown. The fillings were replaced by others that were well contoured and had knuckling points to protect the septa and maintain the teeth in their natural positions. These fillings were finished flush with the marginal walls and polished smooth. As the work neared completion the neuralgia subsided, and now after a year has elapsed the patient reports that there has been no return of same. During this period the patient has continued with her work and has not altered her habits or mode of living.

Another form of malposition that is conducive to considerable irritation in many cases is the pronounced malformation of the roots of some teeth. This is a condition that cannot be readily determined except by the aid of the dental fluoroscope or a radiograph. The possibility of such a condition, however, must be given due consideration when seeking the cause of a nerve lesion or irritation.

Facial neuralgia is such a subtle pain and productive of such dire results that no possible cause should be thought too trivial or be overlooked when endeavoring to cure or afford relief from this veritable bane to existence. In this connection I wish to quote from an article on "Modern Surgery" that recenlty appeared in a popular magazine: "The most agonizing disease known to medical science is tic douloureux or trifacial neuralgia. All the nerves of the face are involved in the exquisite agony. One of the specialists at the Johns Hopkins Hospital estimates that ninety per cent of those upon whom this dreadful ailment fixes itself either commit suicide or go insane. Medicine knew no cure and but little alleviation for this. When the nerve functions were accurately mapped out it was found that the ganglion lying almost in the midline of the skull, on its floor, was the point of convergence of the sensory nerves of the face. If this could be removed all but the

deepest seated cases of trifacial neuralgia could be relieved, but would the patient survive? Much discussion followed the suggestion. On the theory that the victim's life was not worth living, and with the full consent of a patient who gladly accepted any chance of relief, even with death as the probable alternative, a daring surgeon undertook the feat. It was triumphantly successful. The patient's face is now dead so far as any sensation is concerned, a condition not without its dangers, but there is no loss of motor ability. Since then this delicate experiment, calling for a high degree of exactness and technical skill, has been performed often enough to be established as a regular operation."

The treatment of facial neuralgia, certainly in its primary stages, is within the legitimate province of the dental surgeon, and it behooves us as the practitioners of a special science to be prepared to recognize and treat understandingly such cases, that we may spare our patients the possibility of having to undergo such heroic operations. It behooves us also to preach the doctrine of treating causes rather than effects, and this should be done not only among ourselves, but to our patients and the public at large. When the true value of this fundamental principle is appreciated and its precepts practiced, then and not until then will our methods be scientific, safe and sane. I should like to emphasize the words of caution expressed by Dr. Senn, the Chicago surgeon: "Remember this, that with rare exceptions the knife should never be taken up until the trouble is determined. The time for conservatism has come. We are here to assist nature, not to dictate. The great art of modern surgery is to limit operations to the cases where they can be of benefit."—*Brief.*

METEOROLOGICAL CONDITIONS AS AFFECTING NITROUS OXID ANESTHESIA. By Harvey Hilliard, L. R. C. P. Lond., M. R. C. S. Eng.. The subject chosen for my paper may appear at first sight to have little practical importance, but I hope to make clear that in order to obtain the best results in the administration of nitrous oxid gas allowance should be made for weather conditions. The conclusions I wish to prove are adduced from a considerable experience in the administration of nitrous oxid, gained during the last nine years, chiefly at the Royal Dental Hos-

pital of London, where, in the year following my appointment as Assistant Anesthetist, I conducted over 1,500 administrations.

Observing closely the clinical phenomena of the anesthetic in each patient, and working regularly at the hospital on the same class of persons, it soon became evident that the induction, the duration, and all the features of the anesthesia produced were on certain days satisfactory in almost every case, whereas on other days the anesthesias were remarkable for the reverse characteristics, that is to say, jactitation, cyanosis, phonation and fleeting narcosis were present. I noticed that the days on which the cases were unsatisfactory were usually associated with unpleasant weather, whereas the days on which the cases were normal coincided with fine weather. On wet and windy days I therefore learned to expect the patients to behave less satisfactorily, but on fine days I looked for quiet, sleep-like anesthesia. The differences in aggregate results of work according to different weather conditions having once been recognized, it soon became easy in any given day, after a number of administrations had been conducted, to predict with fair accuracy the height of the barometer.

In order, however, to be able to judge correctly the effect of any particular conditions upon the character of the anesthesia produced by nitrous oxid, it is necessary to eliminate as far as may be all contributory factors which might introduce fallacies in a given result, for unless this precaution be taken the value of the evidence collected will be fictitious. The cases must therefore be selected to some extent, and allowances made for such factors as physical type, habits, temperament, pathological conditions, the posture in which the patient is placed for operation, and the effect upon him of having been kept waiting his turn. It is well known, for instance, that obese patients do not take gas in the ordinary manner, and that the administration must be conducted with special regard to their physical condition. Other varieties of physique all call for special treatment, and habits, too, must be considered, heavy smokers and persons accustomed to take large quantities of alcohol behaving under nitrous oxid very differently from those who are abstemious in everything. Again, patients who suffer from chronic constipation, as evidenced by sallow, earthy complexion and foul tongue, do not respond to the influence of nitrous oxid in the manner expected of those with whom the physiological functions are

regular. If the existence of constipation, which has a distinct influence upon the anesthesia, be recognized before the administration of the anesthetic it can be so conducted as to minimize the effect of the chronic toxemia upon the patient, and the narcosis will be more satisfactory, both to him and to the operator, than if the condition had been overlooked or no steps had been taken to obviate these effects.

Temperament is of course a very important factor in the results to be considered, the very nervous, the hysterical, and the pugilistic, soldiers and policemen, for instance, must be eliminated from the list of cases if statistics are to be of proper value. Should one or two patients scream at the beginning of an afternoon's work, and the screams be heard by the other patients outside, it would be useless to make notes of the anesthesias for the rest of that day, because it is the invariable experience at the hospital that if one or two patients behave hysterically all the others will probably do the same.

Posture is important, especially if stertor be taken as a sign of anesthesia, for if the patient's head be tilted too far back upon the headrest the neck muscles will be put upon the stretch, the trachea will in consequence be obstructed by the resulting pressure, the soft palate will be caught in the respiratory stream, and thus early "false stertor" will be produced. With regard to the records of the duration of the anesthesia, it would naturally be misleading to include those cases where the anesthesia, during operations upon the mandible, was prolonged by prevention of elimination of the gas, due to depression of the jaw and pushing back the tongue, with consequent closure of the glottis.

I make special reference to these factors, which might have introduced fallacies in our results, because I have availed myself of the kind help of my late colleague, Dr. Moritz, who during his period of office as House Anesthetist at the hospital noted very carefully a large number of cases for me, together with the meteorological conditions at the time of the administration. We agreed beforehand to eliminate the aforementioned factors in order that our results should as far as possible be approximate. We also endeavored to conduct the administrations in the same manner—that is, the gas-bag was always kept at the same degree of distension, never overdistended, and the gas in consequence given at

a plus pressure, and never sufficiently filled, so that no effort of aspiration was necessary to breathe from it. When air was administered with the gas it was given continuously in definite quantities, and not by the intermittent method. Furthermore, we agreed to adopt the same signs of anesthesia; thus the eye reflexes were not considered, as they are notoriously unreliable; and the guides selected were the character of the respiration, faint stertor, and beginning jactitation in the orbicularis palpebrarum, with dilation of the pupils. The administration was always stopped when these four signs were present, and the gas never pushed to deep cyanosis with marked general jactitation. Similarly identical signs of the duration of available anesthesia were taken by each of us, a clock with a large center second-hand being used to record the time of the induction and of the available narcosis. Those cases in which there was hysterical screaming or doubt about the duration of the actual anesthesia were not included in our notes. Although before we had commenced to make careful records of meteorological conditions during the administration of gas we had a general impression that atmospheric variations considerably affected the course of the anesthesia, yet it was not clear whether this was due to variations of barometric pressure alone, or whether the hygrometric condition of the air or the temperature was not also a contributory factor in the result. For several months therefore, before administrations were commenced, we noticed daily the temperature of the operating room, of the outside air, and the amount of moisture in the air, in addition to the barometric pressure as recorded by a barograph in the room. It was found that the only factor of importance was the barometric pressure, that the results were identical at the same pressures, whether the air was fairly dry or there was rain, whether it was freezing or of summer heat. Latterly, therefore, these points have been disregarded, since also the gas from the cylinders is always dry and becomes warmed to the same temperature by the mucous membrane of the patients' respiratory passages, from which it also takes up a certain amount of moisture before it is absorbed into the blood.

Coming now to the observed results in over 400 roughly selected cases—by "roughly selected" cases I mean that children and old persons were excluded, and only persons of approximately the same type were used for purposes of comparison—it was found that vari-

ations in the atmospheric pressure did not have such a marked effect upon the anesthesia produced by *gas alone* as was observed when air or oxygen was administered with it, and the conclusions arrived at apply with much greater force to the administration of the mixture. With *gas alone* and when the *barometer was high*, i. e., 30 degrees or over, the induction of anesthesia was longer, there was less cyanosis, with a given depth of anesthesia, and distinctly less jactitation; the gas could usually be pushed even to abolition of the conjunctival reflex on a high barometer day without undue cyanosis or jactitation presenting themselves, whereas with gas alone on a *low barometer* day it would be useless to try to abolish the conjunctival reflex, in the hope of obtaining a longer anesthesia, because the patient would become so deeply cyanosed and jactitate so excessively that any increase in the duration of anesthesia would not be available for the operator, owing to the unsteadiness of the head, the venous engorgement of the tongue, and the profuse bleeding.

With an increase in the time of induction of anesthesia the duration of available anesthesia also increases, and with a pressure of 30 inches of mercury or over it was observed that the anesthesia was quiet and lasted nearly as long again as when the barometric pressure fell below 29 inches. The recovery from the effects of the anesthetic is also more satisfactory on fine days; whereas when the *barometer is low* patients are more likely to complain of headache, or a sense of faintness, and are less inclined to get up and walk home immediately after the operation than when the atmospheric pressure is high. These are points of considerable importance to busy practitioners with limited surgery accommodation and will be referred to again.

When administering nitrous oxid during a *fall in barometric pressure* it will be found that cyanosis occurs very early, that in less than a minute jactitation will have become a prominent feature, while the pupils will have only begun to dilate, and that the conjunctival reflex at the same time will be brisk, although the breathing will have become stertorous. The patient is now ready for operation, but the available anesthesia will be short, and it would be useless and dangerous to try and obtain a longer anesthesia by pushing the gas—useless, for reasons stated above, and dangerous on account of the increase in cyanosis with concomitant dilatation of

the heart and displacement of the apex beat outwards. This dilatation perhaps would not matter when the heart is normal, but in the event of any valvular incompetence being present a serious risk would be run of overloading, with consequent failure of the heart. In cases of phthisis also deep cyanosis should be avoided, since it is always associated with pulmonary engorgement, and this rise in the intravascular pressure combined with a fall in the extravascular pressure might cause weak vessels to give way and serious hemorrhage to follow. These points should be remembered, since it is the custom to administer nitrous oxid without any elaborate preparation or examination of the patient beforehand, therefore never push the gas. With low barometric pressure it is found that the available anesthesia is not only short but is frequently noisy, that is to say, the patients will often scream during the anesthetic sleep, and yet on recovery of consciousness be quite unaware of the noise they have made and state that they felt no pain.

With regard to the administration of air with gas, it was found that more air could be given and thus the asphyxial factor in the gas anesthesia eliminated, in proportion to the height of the barometer; that with nearly 31 inches of mercury so much air can be given as to practically prevent any cyanosis or general jactitation, and an anesthesia obtained scarcely distinguishable from that produced by gas and oxygen; that the conjunctival reflex can be abolished without undue jactitation, and that the duration of the available anesthesia is markedly prolonged. When, however, there is a *fall in the barometer* the reverse conditions are observed, namely, that in spite of the admixture of air with the gas considerable cyanosis will be present and jactitation supervene early in the anesthesia; that, in fact, it is not possible to eliminate the asphyxial element and yet obtain satisfactory anesthesia, all the signs of anesthesia presenting themselves after about seventy or eighty-five seconds, and that if more air be admitted or the anesthetic be pushed with the same mixture, no gain in the duration of the anesthesia will be effected. I have sometimes continued the administration of the mixture for more than three minutes without any appreciable effect upon the available anesthesia after removal of the facepiece.

The period of recovery of the patient in these circumstances is interesting—there is a very rapid and striking return of the normal color, an increase in the rapidity of the respiration, and reflex

screwing up of the eyes with lachrymation is very early noticed, indicating a lighter plane of anesthesia, although complete analgesia may still exist. This analgesia must not be expected to last many moments, and the operation should be stopped when watering of the eyes and phonation also accompany the contraction of the eyelids.

The following tables of averages will show precisely the differences in the results effected by the atmospheric pressure:

AVERAGES.

TABLE I.—*Shows a comparison between the administration of Gas only, and Gas and Air, at the same barometric pressure. Barometer, 29.1 inches.*

GAS ONLY.			GAS AND AIR.		
Sex.	Induction.	Anesthesia.	Sex.	Induction.	Anesthesia.
M.	57 secs.	32 secs.	M.	70 secs.	20 secs.
M.	53 "	33 "	M.	75 "	30 "
M.	55 "	30 "	M.	75 "	25 "
M.	60 "	33 "	M.	85 "	35 "
M.	70 "	35 "	M.	65 "	30 "
Av., 5 cases	59 "	32.6 "	Average	74 "	28 "

TABLE II.—*Shows the increase in the length of Anesthesia with Gas and Air when the barometer stands 1 inch higher than in Table I. With Gas only the results may be taken as approximately the same as in Table I. Barometer, 30.14 inches.*

GAS ONLY.

May be reckoned as approximately the same as Table I, but slightly longer.

GAS AND AIR.		
Sex.	Induction.	Anesthesia.
M.	90 secs.	50 secs.
M.	105 "	50 "
F.	90 "	40 "
F.	105 "	45 "
F.	90 "	40 "
F.	105 "	50 "
Average	97.5 "	45.83 "

TABLE III.—*As there is little variation when gas alone is given in the length of anesthesia for the slighter variations of barometric pressure, averages of barometric pressure have been taken for illustration.*

Av. barometric pressure.	No. of cases.	Induction.	Anesthesia.
20 to 29.5	43	68.13	34.79
29.6 to 29.9	96	71.8	37.86
30 to 30.5	80	78.946	44.68

TABLE IV.—*Averages with Gas and Air.*

Barometer.	No. of cases.	Induction.	Anesthesia.
29.1 ins.	11	78.08 secs.	28.27 secs.
29.3 "	18	89.61 "	35.55 "
24.9 "	14	105 "	39.28 "
29.8 "	36	91.8 "	42.05 "
30.1 "	23	112.83 "	45.83 "
30.2 "	11	96.33 "	46 "
30.4 "	20	104.31 "	50.52 "
30.5 "	6	109.6 "	51.8 "

The Practical Application.—As a result of my observations on the influence of barometric pressure upon nitrous oxid anesthesia. I am convinced that when the barometer is low no attempt should be made to abolish the ocular reflexes, and that the administration should be stopped when jactitation shows itself in the orbicularis palpebrarum and other face muscles, when the breathing becomes stertorous and irregular, and when the pupile dilate. I find that better results are obtained when no air is given with the gas, for I have proved that if sufficient be admitted to mitigate the asphyxial symptoms of the nitrous oxid alone, the patients are likely to be noisy and the anesthesia is fleeting.

For these reasons, when the barometer is low I do not advise prolonged administration of gas, either by Mr. Paterson's method, or my own by means of a nasal tube, unless a narcosis of over three minutes is required. If ethyl chlorid be mixed with the gas according to Dr. F. W. Hewitt's method better results are obtained for periods of narcosis of less than three minutes' duration; but for longer anesthesias, after induction with nitrous oxid, a mixture of ethyl chlorid and chloroform, containing half a dram to the ounce, administered by means of a Junker's apparatus, gives the most satisfactory results. In any case, however, when there is a fall in the barometer pressure unpleasant aftereffects are more likely to be met with.

In view of the fact that on low barometer days the anesthesias are shorter than the average, unusually difficult or long operations should not be attempted, and it is wiser not to promise a patient that a lengthy operation will be completed at one sitting. If a patient's friend insists on being present during an administration of gas when the barometric pressure is low, it will be best to warn him that the patient may phonate and become livid in color, and that the available anesthesia will be short.

When, on the other hand, the barometer is high, air or oxygen should always be administered with the gas, for by so doing nearly all the asphyxial symptoms and also the corneal reflex may be abolished, and long, quiet, sleep-like anesthesia induced. Prolonged administrations of gas with air by means of the nasal tube are very satisfactory and long operations may be undertaken; for instance, painful carious cavities can be drilled out and filled. It is better not to mix ethyl chlorid with the gas. No fear need be

entertained of allowing the friends to be present, and if no ethyl chlorid be given no aftereffects are likely to retard the patient's recovery.

DISCUSSION. *The President* considered that the tables contained in the paper would prove both valuable and interesting. With regard to the effect of anesthesia with a low barometer he had had some experience in that direction in the city of Denver, where the average barometer is about 25 inches. Anesthesia there, whether from gas alone or gas followed by ether or chloroform, was brief. He was told when he began the work of anesthetics there he would find that patients would give very little time, and that was what he did find. His experience bore out the tables and statements Mr. Hilliard had brought forward.

Mr. H. H. Capes (Dudley) asked how the author accounted for the very good effects obtained from a mixture of nitrous oxid and chlorid of ethyl. He had found very satisfactory results from mixing in the gas-bag 3 to 5 cubic centimeters of chlorid of ethyl. Other men also had found it satisfactory, but he could not account for it. A person that was very troublesome under gas alone, struggling a great deal, when given the mixture caused no trouble at all and could not detect the presence of ethyl chlorid.

Mr. Hilliard said if the barometer was low it was desirable to add a little ethyl chlorid to the gas according to the method described at Brighton by Dr. Hewitt. But in view of the fact that the aftereffects were more common with ethyl chlorid, he did not think the result justified the means when the barometer was high, because far better results could be obtained with prolonged nitrous oxid, with which there were no aftereffects in the great majority of cases. He did not think a patient should be subjected to the risk of faintness and sickness produced by ethyl chlorid when there was a high barometer. He did not wish it to be understood that he had bad aftereffects in the majority of instances in the use of ethyl chlorid with gas, as this was not the case, but he knew that generally aftereffects from ethyl chlorid were common. He read a paper on Ethyl Chlorid a little time ago in which he pointed out that the aftereffects were in direct proportion to the duration of the administration. It was one of the most lethal of anesthetics known, and a large number of deaths had been recorded in a short space of time. He always advised an ample dose given gradually and briefly,

rather than a smaller dose and the inhaler applied for a longer time. —*British Dental Journal.*

PULP CONSERVATION. Those observant of the trend of professional sentiment during the past few years cannot have failed to note the tendency to minimize the importance of the dental pulp as a factor in the continued usefulness and well-being of the teeth. A quarter of a century ago and up to a comparatively recent period the trend was markedly in the other direction, pulp devitalization being quite generally regarded as entailing conditions always in a high degree inimical to the healthfulness and consequently the continued functional efficiency of the dental organs. One of the logical results of the conservative phase of thought was often much misdirected effort expended in the attempt to preserve pulps hopelessly diseased, while the result to be feared from the opposed teaching of to-day is that many pulps will be needlessly and injuriously sacrificed.

Changes in professional sentiment so radical as those noted are not to be regarded as wholly unreasoning, however erratic they may appear. As with many other opposed doctrines in an imperfect healing art the golden mean of truth is to be sought for between the extremes. Indeed, the problems involved in the conservative or non-conservative treatment of the dental pulp are too complex to justify dogmatism. The essential facts of dental physiology and pathology have not changed, however much our interpretation of those facts may have undergone modification. That the pulp is vitally essential to the tooth during the developmental and formative period is, of course, unquestioned and unquestionable. Without the pulp there can be no structural growth, and without perfected growth perfect health for the tooth and its adnexa is impossible. Hence the principle that at least up to the period of full maturity pulp vitality is essential to tooth integrity must be accepted, as must also the equally obvious fact that the more nearly dental growth approaches completeness the better the pulp can be spared.

The tooth-building function of the pulp is, however, by no means completed when the tooth has attained its perfected form; maintenance and repair are subordinate but by no means unimportant offices committed to its charge. In the office of mainte-

nance of root tissue at least the alveolodental membrane is an efficient and indispensable coworker, and one which under favoring conditions performs its task unaided by the pulp, at least to the degree necessary for the continued functional usefulness of the tooth. The increased ability of dental art to supply the favoring conditions required to this end is the real basis of and best justification for the lessened importance now attached to pulp conservation.

Broadly speaking, the favoring condition chiefly required is asepsis, secured through the prevention or arrest of that tissue infection which without the aid of dental art is the inevitable result of pulp devitalization. This result has been secured through several agencies, chief among which are safer methods of pulp devitalization, when that has been necessary; more thorough and efficient medication for the prevention or arrest of septic conditions, improved technic in the removal of devitalized tissue from root-canals, and more efficient methods and better material for root-canal filling. Add to these advances in methods of practice the further fact that the tooth-crown, weakened as it always is by pulp devitalization, is replaceable by some one of the many artificial substitutes now at command, and with results fully restorative of functional usefulness, and it can hardly be denied that for well-matured teeth at least there is a large measure of justification for the lessened importance now attached to the preservation of the pulp.

This measure of justification, however, should not blind us to the obvious fact that as normally the function of the pulp ceases only with life, a healthy tooth is never the better but always the worse for its loss. However much we may minimize the evils consequent upon devitalization, we can never wholly prevent them. Owing to insuperable mechanical difficulties the most improved technic in the preparation of a devitalized tooth may fail of success; owing to local conditions or systemic predispositions the most advanced methods of treatment may end in disaster.

When all is said there is a vast difference between a tooth root environed within and without by protective living tissue, and through whose dentinal and cemental walls life-giving vital fluids course in perpetual osmotic flow, and one in which they stagnate, all vital resisting power to untoward influences being lessened because life without is tied to death within. Viewed from this stand-

point the most perfect root-filling is but a sorry substitute for a normal pulp in a healthy tooth, and as a great majority of root-fillings, especially in multirooted teeth, are far from being perfect, there is as a rule not only osmotic stasis, but septic decomposition of the circulatory fluids always present in the tubuli and unfilled apical spaces.

While it is true that when not in too great number the micro-organisms causative of such decomposition are readily held in check by phagocytic forces, and that as fast as formed the products can be eliminated by solution and absorption, still the tissue upon which the burden of such elimination continuously falls cannot in any case fail of deterioration, while there is always the possibility that when resisting power is weakened by lowered general vitality the parts involved may succumb to inflammatory septic infection.

Hence as the health status of a devitalized tooth is at best one of mild invalidism, with the ever-present possibility of graver forms of degeneracy, there is every reason why pulp conservation should still be maintained as a guiding principle of practice—a principle to be violated only when there is the fullest assurance that for the untoward effects of pulp devitalization the patient will secure exemption from a greater evil or gain a more than compensatory good.—Editorial in *Brief*.

INTERESTING CASE OF NECROSIS. By W. H. Haller, Portsmouth, Va. Read before the Virginia State Dental Society, 1904. There was very little surgery connected with this case, but it was interesting to me for the reason that I could find no cause for such conditions. The patient was a boilermaker, employed in the Navy Yard, 29 years old and apparently in good health. I first saw him about the first of October, 1903, when he was sent to me by his physician, to have a first superior left molar extracted. I found the tooth sound, but the palatine root entirely denuded and a semicircular ulcer extending up on the palatine mucous membrane. The tooth was very sore to percussion and the surrounding tissues were highly inflamed. After extracting I found the root entirely free from calculus except for a little salivary deposit about it neck.

This tooth first began troubling him about the first of September, 1903. During November his physician sent him to me again, when

I found the second bicuspid in the same condition as the molar had been. The ulcerous surface and inflammation had extended until they involved the greater part of the mucous membrane on the left side of the palate. The tooth was very sore and loose. I extracted it and found some deposit on the root, but very little, and the tooth was sound in every particular.

I advised him to visit his physician for further treatment and did not see him again until January 1, 1904, when he came to me to have what he supposed to be a root extracted. It proved to be a piece of the alveolar process showing through, and on examination I found a large piece of exfoliated bone. I telephoned his physician, who came down and we removed an irregular piece about an inch in length and involving one-half the floor of the antrum. I continued treating the case from that time, and on January 30 removed some edges of necrosed bone with the chisel, and still later found an ulcer starting just over the palatine root of the second molar, which I bored out with a stick of nitrate of silver, and it healed without further trouble. I continued treating the case with peroxid of hydrogen and glyco-thymoline until it healed thoroughly, and there has been no further trouble.

The patient has never had syphilis and there is no history of syphilis in his family. His physician thinks the trouble was due to irritation from the teeth extracted, but I cannot see why such a little deposit on the root of one of these teeth should produce so much trouble in so short a time. My idea is that it was due to phagedenic pericementitis involving the apical pericementum, causing death of the pulps, infection and pus discharge, but if this be true, there is no evidence of any other teeth being affected up to this time. The patient states that six years previous he had a similar trouble on the right side of his mouth, which disappeared without treatment and has made no further reappearance.—*Summary.*

FORMALIN FOR HARDENING THE PULP. By J. I. Hart, D.D.S., New York City. Read before the Northeastern Dental Association, October 19, 1904. One of the most exacting operations we are called upon to perform is the removal of the dental pulp from fine, tortuous root-canals. If this operation is successfully performed under aseptic conditions the result is a useful root, other-

wise it will eventuate in chronic pericementitis and probably the loss of the tooth.

Various methods have been suggested for the painless removal of the dental pulp. First, Spooner suggested the use of arsenic for its devitalization; more recently we have employed pressure anesthesia and removed it painlessly while thus anesthetized. The main objection to its removal while vital is, that we usually encounter a persistent hemorrhage that is somewhat difficult to control, and owing to the consistence of the pulp it is difficult to remove it *en masse*. Dr. Harlan has suggested a method of digesting the pulp after its devitalization, but in my hands this is not so satisfactory as is the hardening of the pulp by the use of formalin. When this is accomplished we render the consistence of such a character that the pulp is readily withdrawn.

The substance known as formaldehyd was first discovered by Van Hoffman in 1867, who obtained it by passing a vapor of wood alcohol mixed with air over finely divided platinum sponge heated to redness. Formalin is a 40 per cent solution of chemically pure formaldehyd gas in water. Formaldehyd or formic aldehyd is a gaseous compound formed in small quantities, together with formic acid and marsh gas, by the action of static electric discharges on a mixture of hydrogen and carbon dioxid. Investigation by the celebrated chemist Baeyer points to formaldehyd as the natural protector of the tender parts of plants, it being generated by the action of sunlight on the carbonic acid and water of the air in the presence of the green coloring matter of leaves. Formaldehyd gas possesses very high germicidal properties, destroying microorganisms even in attenuated solutions. It is neutral, being neither acid nor alkaline. The vapor is extremely pungent and very irritating to the eyes and mucous membrane of the nose and throat. As weak solutions are effective and stronger ones so irritating, we should confine our use of it to solutions not stronger than 5 per cent. Formalin mixes with water in all proportions; it therefore becomes a simple matter to prepare any dilution desired. Dr. G. Bergonzoli states that he has "found from his observation that solutions of formalin are deodorant and disinfectant, and that pieces of tissue immersed in it are rapidly fixed and hardened."

With regard to the employment of formalin as a hardening agent for animal tissues, Dr. McAdam Eccles (*Brit. Med. Jour.*) calls

attention to the usefulness of this adjunct in pathological and histological work. From his experience, formalin in from 10 to 20 per cent solution acts as a most satisfactory and rapid hardening agent. Although hardening is effected very rapidly by such concentrated solutions, I prefer to use a weaker solution, allowing a longer time for its action. The hardening effect of formalin is dependent on a coagulation of the protoplasm by the vapors that are absorbed. The desire to harden the pulp has latterly been manifested by the addition of tannin to the arsenic in the formulas suggested for pulp-devitalization, but its effect has been at best indifferent; with formalin, however, the change is most marked.

My method is to apply arsenic fiber to the exposed pulp, if not inflamed, for from 24 to 48 hours, and then under aseptic precautions to remove the bulbous portion of the pulp and place in contact with the stump a 5 per cent solution of formalin. This is left in contact and sealed in for three days, when we find the pulp of the consistence of catgut and readily removed with the pliers. I have refrained from any description of the application of the arsenic, the technic of the extirpation of the pulp, or the obliteration of the space, as you are familiar with these topics, and I hesitate about taking up valuable time in the consideration of matters already well understood.—*Cosmos.*

SEA WATER—BROUGHT MUCH OF IT WITH US.—In M. Quinton's view (*Lancet*), sea water is the natural source from which, as Haeckel believes, those elementary bodies have their rise which in turn develop into every other species, human being included. The environment in which the anatomical elements of living creatures exist is neither more nor less than a marine one. Our tissues and cells continue to exert their functions in a fluid the composition of which presents the closest resemblance to that of sea water. Hitherto the number of elements entering into the composition of a living body has been considered to be about fifteen, but the researches of M. Quinton have shown the existence of traces of at least some fourteen other elements which are also found in sea water, such as copper, lead, silver, gold and others. Further, if an animal be bled to exhaustion, and the place of the blood be supplied by sea water, on the morrow the animal will have regained its strength, and at the end of five days its recovery is complete. M. Quinton has injected into animals a quantity of sea water greater than their own body weight without any toxic effects, whereas an injection of pure water rapidly brings about death. Sea water, then, appears to be the true nutrient fluid of animals, their natural plasma, in fact.

The Dental Digest.

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At 2231 Prairie Avenue, Chicago,

Where All Communications Should be Addressed.

Editorial.

DENTISTS AS DIETICIANS.

We would call the special attention of our readers to two articles in this month's issue—one on page 793 by Dr. S. A. Hopkins, and the other on page 805 by Dr. A. B. Spach. Both deal with the subject of diet, the latter being a complement of the former. A few years ago it would have been thought that a dentist was overstepping the bounds of his domain, usurping the functions of the physician, and meddling with what did not concern him if he ventured to prescribe a diet for patients or to question them regarding same. At this day, however, conditions are wholly different, and while some members of a dentist's clientele might at first resent his inquiries into their habits of eating, their prejudices could soon be overcome and their interest and cooperation enlisted when the close relationship existing between diet and the teeth was explained. Nowadays it is not only the privilege but the absolute duty of the dental profession to make a study of diet and nutrition, first, for their own personal benefit, and second, so as to be able to help their patients. Few dentists study even their own diet, and yet no class so greatly needs knowledge on that subject. The practice of dentistry is sedentary and confining, and the lack of exercise, fresh air, sunshine and mental diversion which it entails brings on indigestion, with its accompaniments of bad breath and impaired efficiency. Dr. Hopkins shows that with rare exceptions people eat too much and do not masticate their food thoroughly, and since it has been proven that some men doing concentrated mental work, and other men taking a great deal of vigorous exercise, improved their health and increased the quality and quantity of their work by a reduction of diet and an increase in mastica-

tion, members of the dental profession could make personal experiments along this line to great advantage.

Taking up the second and more important phase of the question —the advising of their patients—dentists have more opportunities than physicians, for the latter see patients only when sick, and then their tongues are usually coated, their breaths bad and their stomachs deranged, as a result of the systemic disorder, and the physician consequently has no opportunity of knowing that such conditions are chronic. Dentists, however, see their patients in normal physical condition, and so can judge whether or not their digestion is what it should be, and a little explanation of how indigestion promotes decay of the teeth would in most cases secure the intelligent cooperation of the patients in correcting the condition. To take up the matter as early as possible, dentists should explain to their pregnant women patients how greatly their diet affects the teeth, bones and health of their offspring, not only during fetal life, but for many years after birth. Then the diet for the first few years of the child's life should be studied out carefully, and when children present with evidences of impaired nutrition or indigestion the attention of the parents should be called to same. The importance of thorough mastication cannot be too strongly emphasized, and thus do dental services become more valuable, for without an efficient masticatory apparatus proper mastication cannot be secured. It will not be long before every progressive dentist will take up the study of physiological chemistry, and thus not only will his patients, from infants to grandparents, be benefited as to their health and their teeth, but he also will be profited, for the greater and more valuable the service which the dental profession renders the public, the greater will be the appreciation and respect of the latter for its members and their work.

Notices.

SOUTHERN CALIFORNIA DENTAL ASSOCIATION.

The Southern California Dental Association will hold its eighth annual session in Los Angeles, Nov. 6-8, 1905. A cordial invitation is extended to the profession.

CHAS. M. BENBROOK, Secy.,
455 S. Broadway, Los Angeles.

SEDALIA (MO.) DENTAL SOCIETY.

The Sedalia Dental Society met in regular session Aug. 25, 1905, and elected the following officers: President, Phil. Lamm; Vice-President, N. U. Howard; Secretary and Treasurer, D. Fletcher Carter.

UTICA (N. Y.) DENTAL SOCIETY.

The annual meeting of the Utica (N. Y.) Dental Society for the election of officers was held Aug. 17, 1905, with the following result: President, Dr. Tompkins; Vice-President, Dr. Capron; Secretary, Dr. Clapp; Treasurer, Dr. Simmons.

MINNESOTA STATE BOARD OF DENTAL EXAMINERS.

The next meeting of the Minnesota State Board of Dental Examiners will be held at Minneapolis, Oct. 3-5, at the Dental Department, State University. All applications must be in by twelve o'clock noon, Oct. 3. Application blanks will be furnished upon request by F. S. JAMES, Secy.,
Winona, Minn.

NORTHEAST NEBRASKA DENTAL ASSOCIATION.

The Northeast Nebraska Dental Association was organized Aug. 24, 1905, and the following officers were elected: President, C. E. Brown, Emerson; Vice-President, T. B. Hickert, Wayne; Corresponding Secretary, C. S. Barker, Norfolk; Recording Secretary, E. M. Hagan, Bancroft. The next meeting of the Association will be held in Norfolk sometime in October.

SEVENTH AND EIGHTH DISTRICT DENTAL SOCIETIES OF THE STATE OF NEW YORK.

The Seventh and Eighth District Dental Societies of the State of New York will hold a union meeting at the Osburn House, Rochester, Oct. 31 to Nov. 2, 1905. Mark these dates off in your appointment book and attend. It will be time well spent. If you have anything of interest communicate with the Business Committee, C. F. Bunbury, Chairman, 62 State St., Rochester; J. W. Graves, 32 Triangle Bldg., Rochester; S. Eschelman, 421 Franklin St., Buffalo; D. H. Young, Attica. Clinic Committee, G. G. Burns and F. Messerschmitt, Rochester.

RESOLUTIONS ON DEATH OF DR. H. FINLEY HELMS.

Whereas, in the death of our friend and fellow practitioner, Dr. H. Finley Helms, this society has sustained the loss of a beloved member, who by his dignity and counsel added much to the profit and interest of its meetings, and who as its honored president did all in his power to promote the welfare and high professional standing of its members, and,

Whereas, In the association with the members of the society he ever dis-

played a kindness of nature and generosity of heart which will always be remembered with the warmest affection, be it

Resolved, That an expression of our sympathy and condolence be extended to his wife and relatives, and be it further

Resolved, That a copy of this resolution be given to the local papers and dental journals for publication and that they be placed on the records of this society.

LINCOLN ODONTOGRAPHIC SOCIETY,
W. T. HUMPHREY,
E. G. ANTRIM,
F. D. SHERWIN, } Com.

NATIONAL ASSOCIATION OF DENTAL FACULTIES.

The 22nd annual meeting of the National Association of Dental Faculties, held at Buffalo, July 27-28, 1905, resulted in the election of the following officers and committees: President, J. H. Kennerly, 2645 Locust St., St. Louis. Vice-President, J. I. Hart, New York. Secretary, George Edwin Hunt, 131 E. Ohio St., Indianapolis. Treasurer, H. R. Jewett, Atlanta, Ga. Executive Committee, D. J. McMillan, Kansas City; L. P. Bethel, Columbus; J. B. Wilmott, Toronto; R. M. Sanger, East Orange, N. J.; H. B. Tileston, Louisville. Ad Interim Committee, S. H. Guilford, Philadelphia; M. C. Marshall, St. Louis; J. P. Gray, Nashville. Foreign Relations Committee, G. V. Black, Chicago; W. F. Litch, Philadelphia; D. R. Stubblefield, Nashville; William Carr, New York; J. D. Patterson, Kansas City. Forty-three of the fifty colleges holding membership were represented by delegates and a most harmonious meeting was held. United States Consul J. H. Worman, Munich, Germany, was present at one session and told what was being done to rehabilitate the American degree in that country. Announcement was also made that the United States Government had recognized the National Association of Dental Faculties in its act regulating the practice of dentistry in the Philippine Islands.

GEORGE E. HUNT, Secretary.

CLINIC OF THE FRATERNAL DENTAL SOCIETY OF ST. LOUIS.

The first annual clinic of the Fraternal Dental Society of St. Louis will be held at the Barnes Dental College, Nov. 20 and 21, 1905, with headquarters at the Jefferson Hotel. Special papers by E. K. Wedelstaedt of St. Paul, Clinics by A. C. Searl, J. F. Wallace, Wm. Finn, C. N. Booth, J. J. Booth, E. S. Brown, W. T. Rutledge and others, bearing on the Black and Wedelstaedt methods and principles of cavity preparation and filling. Drs. F. E. Roach and Geo. T. Banzett of Chicago, W. Leon Ellerbeck of Salt Lake City, and others will demonstrate the various phases of porcelain work. The time-proven advantages and disadvantages of high and low-fusing bodies will be shown. Others will operate, showing methods in dental prosthesis and orthodontia. All ethical practitioners are invited to be present and clinic. Please send your name and subject of clinic to the secretary. Exhibit space to be obtained by application to the secretary. A full line of exhibits will be

shown in a beautiful exhibit room. A cordial invitation is extended to the profession to be present and make this meeting, limited in scope but limitless in importance, the best ever held in this section. All inquiries should be addressed to D. O. M. LeCron, Supt. of Clinics, 501 Missouri Trust Bldg., or to the Secretary. S. H. VOYLES, Secy., 3201 Washington Ave.

DENTAL COMMISSIONERS OF CONNECTICUT.

The Dental Commissioners of the State of Connecticut hereby give notice that they will meet at Hartford on Wednesday, Thursday and Friday, Nov. 8-10, 1905, to examine applicants for license to practice dentistry and for the transaction of any other business proper to come before said meeting. Practical examination in operative and prosthetic dentistry will be held Wednesday, Nov. 8. The written theoretical examination will be held Thursday and Friday, Nov. 9 and 10. All applicants should apply to the recorder for proper blanks and rules for conducting the examinations. Application blanks must be filled in and sworn to and, with fee, filed with the recorder on or before Nov. 1, 1905. GILBERT M. GRISWOLD, Recorder.

News Summary.

B. M. BLACK, a dentist of Pine Bluff, Ark., died Aug. 22, 1905.

J. C. MCINTIRE, formerly a dentist of Williamsport, Pa., died Aug. 29, 1905.

JOHN S. CARROLL, 80 years old, a dentist of Covington, Ga., died Aug. 21, 1905.

THOMAS G. LOCKERMAN, a dentist of Washington, D. C., died Aug. 8, 1905.

F. R. RICHARDS, a dentist of Chicago, Ill., committed suicide Sept. 6, 1905.

S. J. SAWYER, 70 years old, a dentist of Milwaukee, Wis., died Aug. 21, 1905.

DEBOW DONOHO, 27 years old, a dentist of Lebanon, Tenn., died Aug. 4, 1905.

J. T. DEVOL, 81 years old, formerly a dentist at Parkersburg, W. Va., died Aug. 13, 1905.

G. J. HARRIS, 65 years old, a dentist of McMinnille, Tenn., died suddenly Aug. 16, 1905.

J. V. JOHNSON, 60 years old, a dentist of Birmingham, Ala., died Aug. 13, 1905, from paralysis.

GEORGE A. HENDERSON, 40 years old, a dentist of Pittsburg, committed suicide Aug. 24, 1905.

TO REMOVE FOREIGN BODIES FROM THE EAR, dip the end of a camel's hair brush in glue and leave it in position against the body. When dry, after a

few hours, pulling on the brush will remove the whole thing.—*Canadian Practitioner.*

WILLIAM H. CAHILL, 42 years old, a dentist of Hartford, Conn., died of acute uremia, Aug. 15, 1905.

JOSEPH LEWENBERG, 47 years old, a dentist of New York, died Aug. 17 from liver and heart trouble.

E. F. EARLY, a young dentist of Newbern, N. C., died from an operation for appendicitis Aug. 31, 1905.

W. S. FOOTE, 82 years old, formerly a dentist of Belvidere, Ill., died from paralysis in Chicago Aug. 8, 1905.

MARION WARNER, 42 years old, a dentist of Secor, Ill., was shot and killed by a drunken man Aug. 5, 1905.

O. S. PAIGE, 64 years old, a dentist of Taunton, Mass., where he also served three terms as mayor, died Sept. 1, 1905.

HERBERT A. ROGERS, formerly a dentist of Gloucester, Mass., died from a hemorrhage in Colorado Springs, Col., Aug. 20, 1905.

J. P. FANN, a dentist of Ardmore, I. T., was shot and probably fatally wounded Aug. 7 in a quarrel over family affairs.

CUCUMBERLIKE.—Some live like a cucumber; cling to their vine, and serve no higher end than rotundity and relish.—G. F. Butler.

HUSH MONEY.—"I call that hush money," said the happy father to the chemist, as he placed twenty-five cents on the counter for a bottle of soothing syrup.

BANKRUPT.—Wm. S. Lofton, a dentist of Washington, D. C., filed a petition in voluntary bankruptcy Aug. 18. It is stated that the reason for his action lies in the fact that he was a stockholder in a bank which recently failed.

OF COURSE, you can fool some people all the time, but when you consider what kind they are it hardly seems worth while.

CEMENT AS A BASE FOR FILLINGS.—F. W. Stephan, in *Review.* The value of cement as a base for gold or amalgam fillings cannot be overestimated. I fill nearly all deep cavities with cement, afterward cutting out enough to form the ideal cavity.

GOOD CROPS BRING PROSPERITY.—A Georgia farmer (says *The Critique*) made $100 from an acre of watermelons, and the nearest doctor made $200 from the same acre.

QUICK INVESTMENT MATERIAL.—For quick investment for soldering bands, clasps and teeth, the following mixture may be kept on hand ready prepared: Equal parts of prepared chalk and fine sand, kneaded in glycerin, making a plastic mass similar to mouldine.—*Hints.*

DENTIST KILLED FOR SEDUCTION.—Dr. F. S. Wright of Arkadelphia, Ark., reports the following incident: On Aug. 2 J. C. Legate, a dentist of Gurdon, Ark., was arrested for the alleged seduction of a girl about 19 years old. On the day of his arrest he married a young widow of some means who put

up a cash bond for his appearance in court. On Aug. 21 he was shot and instantly killed by the brother of the young woman whom he was accused of wronging.

WRITE IT indelibly in your heart that it is better to be a successful cobbler than a botched physician or a briefless barrister.

ALUM FOR THE HANDS OF OPERATORS.—W. J. Hemphill, in *Review.* A piece of alum of suitable size kept in a convenient place will be found useful where the operator's hands perspire frequently. Draw the fingers over the alum once and it will usually be effectual.

NEEDED AT HOME.—"My friend," said the fakir at the street corner, "I can sell you a salve for 10 cents that will cure that big wart on the back of your hand." "I don't want it cured," the hollow-eyed man in the crowd responded, "the baby uses it to cut his teeth on."

DENTIST A BIGAMIST.—George A. Witzhoff, who claims to be a Swiss dentist and chemist, is thought to have at least fifty wives scattered throughout the United States. In all cases he married the women for their money and deserted them so soon as he secured it.

LOST SPEECH IN DENTAL CHAIR.—An elderly woman at Millville, N. J., had several teeth extracted a few weeks ago, a local anesthetic being used. Since the operation she has lost all power of speech and physicians who have examined her are unable to account for her condition.

THE BRITISHER FUMBLED.—"Anyway," said the joker, "you can't expect anything but ire from Ireland." But when this rare stroke of humor reached the British House of Commons the member said, "Naturally we must anticipate grievances from the Emerald Isle," and he wondered why they didn't laugh.—*Toronto Star.*

NOSE BLEED.—Grasp the nose between the thumb and forefinger, and press backwards against the alveolar border of the maxilla and downward against the teeth. This compresses the lateralis nasi and septal arteries. Satisfactory results also follow the use of tannin and acetanilid.—*Laryngoscope.*

N. S. WOODWORTH, 63 years old, for forty-two years in the practice of dentistry in Monmouth, Ill., died from a complication of organic troubles at his home June 1, 1905. He has always been an active worker not only in his profession, but for the interests of the city, and will be greatly missed by both.

"DO HOGS PAY?" asks a farmer's journal. Lamphear, the inimitable, who spells "kissed" *"kist,"* says that in his experience they do not; that they take a medical journal about five years without paying for it, and then return a copy to the publisher marked "refused." We have had some experience of that kind. No, hogs don't pay.—*Tex. Med. Jour.*

HOW TO COLLECT SPILLED MERCURY.—A writer in *Technics* says that mercury spilled on a table or floor is somewhat hard to collect, unless special precautions are taken, owing to its tendency to divide into small globules, which roll away at the slightest touch. If a wet ring is made round the

spilled mercury by means of a wash bottle or otherwise, it will be found that the globules of mercury cannot readily cross this ring; the mercury can then be collected without difficulty in a small shovel made from a piece of thin card, or even in an ordinary envelope.

MOUTH BREATHING: TREATMENT.—The first step is to remove the cause, which is generally enlarged tonsils, adenoids, or both. This being done, the next step is to spread the arch, placing the teeth in normal occlusion. In young patients this also has the effect of straightening the septum and avoids the necessity of septal operation.— DR. T. E. CARMODY, *Items.*

STRICTLY PROFESSIONAL.—A London dentist, says the *Brit. Jour. Dent. Sc.*, born at Yarmouth, recently desiring to make some gift to his native town, chose a novel form of carrying out his intention. He wrote to the board of guardians offering to present twelve of the deserving poor with a set of teeth each. The board accepted the offer with many thanks.

DIVORCES.—Aug. 23 Myra Munson brought suit for divorce against her husband, Virgil H. Munson, a dentist of New Haven, Conn. She named as the basis of her complaint his alleged abduction of and intimacy with a young woman.—Cora B. Sanford, wife of Harry LaMott Sanford, a dentist of Syracuse, N. Y., was on Aug. 7 given an absolute decree of divorce.

USEFUL APPLICATION FOR SORE LIPS WHILE OPERATING.—W. J. Hemphill, in *Review.* I find that a little collodion is very useful to apply to sore lips before beginning to operate. It takes out the soreness, protects the lips, and they heal rapidly after the application. It is also useful to apply to wounds on the hands, as it reduces the danger of infection and washing will not remove it.

ONE OF THE REALLY PAINLESS KIND.—"Ten dollars for filling one tooth. Why, Doctor, it didn't take you more than an hour!"

"It took me a good deal longer than that, my friend. You went to sleep while I was working at it, and you slept nearly a whole hour."

"Well, great Scott! Are you going to charge me sleeping car rates for the nap?"—*Chicago Tribune.*

TOOTHACHE CAUSES SUICIDE.—A man at Brooklyn, 54 years old, recently had an abscessed tooth extracted. The operation did not relieve matters, however, as his face swelled and the pain was so great that his physician had to administer opiates to enable him to sleep. He was found dead one morning, having committed suicide, and it is thought that he took his life while in a paroxysm of pain.

EXAMINING BOARD AFFAIRS.—Last month we outlined the condition of affairs in California. Since then the governor has appointed a commission to investigate the charges made by various members of the board against each other and those made against the board by outsiders. Members of the board have called each other liars and witnesses have made various charges against them. Nothing has been settled as yet, but it is very evident that perjury is being committed on one side or the other, as the two factions of the board tell quite different stories. The man whom we reported last

month as having brought a damage suit of $50,000 against the board has withdrawn same.—Aug. 25 C. B. Bratt of Allegheny and G. W. Klump of Williamsport were reappointed members of the Pennsylvania board by the governor.

BARKIS WAS WILLING.—Robert Clarke, the artist, tells this story: "One day, while out walking with a friend of his, this friend complained of a toothache and asked Mr. Clarke what he could advise him to buy, as they were in front of a drug store. 'Why,' said Mr. Clarke, 'the last time I had a toothache I went home and my wife kissed it away for me.' After a moment's pause his friend said: 'Is your wife home now?' "—*Chicago Tribune.*

TRIFACIAL NEURALGIA.—The pain of trifacial neuralgia is immediately relieved by injections of osmic acid, and in a large percentage of cases for a long period of time. All of the nerve branches should be injected, the palatine, lingual, mandibular, infra- and supraorbital; they can all be exposed through small mouth incisions except the supraorbital. Occasionally it is necessary to inject the auricular branch.—*Jour. A. M. A.*

PYORRHEA ALVEOLARIS.—If every particle of irritant and foreign matter was removed from about the teeth more than seventy per cent of the cases of so-called pyorrhea would get well of themselves with no other therapeutic treatment than an alkaline mouth-wash. Successful practice means careful and thorough manipulation, and no amount of therapeutic treatment can supplement it or take its place.— F. G. WORTHLY, *Western.*

HE GOT IT IN THE NECK.—"F. W. R—— * * * * * had been troubled with a cataract on his left eye * * * * When the doctor seen that there were no hope of recovering the use of this eye * * * * Dr. ——— performed one of the most skillful operations known to science, that of uniting the optic nerve of the left eye to the nerve of the right eye. The operation was performed in the back of the neck."—*Chanderville (Ill.) Times.*

CREOSOTE NOT INTENDED FOR SPRAYING FLOWERS.—Aug. 15 a young woman at Philadelphia was on an excursion with some friends and was carrying a bouquet and a bottle of creosote, the latter of which she was using to relieve toothache. Unaware of the properties of the drug, she sprinkled it upon the bouquet and tossed same to a woman companion. The latter threw it back and it struck the young woman full in the face, the creosote burning her severely. Physicians at the hospital to which she was taken are hopeful that no trace of the marks made by the drug will remain permanently.

TERRIBLE PREDICAMENT.—An eminent London physician has a telephone in his bedroom. One night the bell rang, waking both him and his wife. The medico went to the 'phone and heard, "Please come at once to Lucessia Square—Lady Brown is very ill." Handing the 'phone to his wife, with an imprecation, he said to her, "For Heaven's sake, say the doctor is out of town." The wife complied. Next morning the doctor called at the Brown mansion to express his deep regret to Lord Brown that he had been absent

when called. "But you were really not at home?" inquired his lordship. "Of course not," responded the doctor. "Then, my dear doctor," said Lord Brown, "I must sympathize with you in your terrible misfortune, for I distinctly heard a man's voice in your bedroom, talking to your wife."

ORAL ANTISEPSIS.—If a mouth from youth to maternity be kept hygienically clean, there can be no bacterial action producing caries upon the crowns of the teeth; if the salivary calcic deposits (which is effete matter being filled with constant fresh supplies of fermentable food débris, of which microorganisms take full possession) are not allowed to accumulate there can be no calcic traumatism or toxic destruction at the gingivæ.—H. C. REGISTER, *Items.*

TO KEEP A GINGIVAL MARGIN CAVITY DRY WITHOUT RUBBER DAM.—R. E. Sparks, in *Review.* Prepare the cavity and place a napkin in position. Saturate a little floss silk, or small, loosely-twisted thread of absorbent cotton with thin cement. Dry the cavity and pack the silk or cotton around under the gum margin. This method is often useful where the rubber and clamp are in position and the rubber is stretched and does not pass under the gum margin at the sides of the clamp.

EXCUSABLE.—"You didn't meet your appointment two weeks ago," said the dentist to his youthful patient.

"No; didn't mamma phone you?"

"Yes; she said you had the mumps. Was your face much swollen?"

"I should think it was; I had to go through the door sidewise."—*Dent. Off. & Lab.*

REMOVAL OF CROWN SET WITH GUTTA-PERCHA.—For the application of heat a very satisfactory little Bunsen can be made by removing the curved platinum point of an abscess syringe, inserting it in a piece of hard rubber tubing of proper diameter. A six-inch length of tubing affords a good hand-piece. Attach to gas connection with soft rubber hose—red rubber hose of thin pliable weight is preferable. This can be carried to any part of the mouth with perfect safety.—BENSON SELLERY, *Northwestern.*

ILLEGAL PRACTITIONERS.—Aug. 2 a man at Sacramento, Cal., was fined $50 for practising dentistry without a license.—Aug. 10 a Japanese dentist at Sacramento was fined $50 for the same offense.—E. L. Burns of Boise, Ida., a member of the Idaho Board, reports that on June 10 he had the proprietor of a dental parlor arrested for practising without a license. The defendant put up a cash bond of $50, but forfeited same by removing to California before date of his trial.—Aug. 10 a man at Waupun, Wis., was fined $32 for illegal practice.

MR. DOOLEY ON "MEDICAL SCIENCE."—"The pa-apers tells me that midical science has kept pace with th' hop-skip-an'-a-jump iv mechanical inginooty: Th' doctors has found th' mickrobe iv ivrything fr'm lumbago to love, an' fr'm jandice to jealousy, but if a brick bounces on me head I'm crated up th' same as iv yore an' put away. Rocyfellar can make a manny out iv a bar'l iv cude ile, but no wan has been able to make a blade of hair grow on Rocyfel-

lar. They was a doctor over in France that discovered a kind iv a thing that if 'twas pumped into ye wud make ye live till people got so tired iv seein' ye around they cud scream. He died th' nex' year iv premachure ol' age. They was another wan cud insure whether th' nex' wan wud be a boy or a girl. All ye had to do was to decide wud it be Arthur or Ethel an' lave him know. He left a family iv unmarredgable daughters.

PERIODONTITIS.—A tooth in which caries has occasioned gangrene of the pulp is a source of septic infection with constant leakage into the very vascular tissue immediately surrounding the apices of the roots, a tissue very susceptible to septic irritation; hence a tooth tender to the slightest touch in consequence of periodontitis is a very familiar object. In case of an upper molar there is risk of infection of the antrum. In the lower jaw it may track down even as far as the thoracic cavity with disastrous results.—NORMAN G. BENNETT, *Brit. Dent. Jour.*

ACCIDENTS.—Aug. 11 a vulcanizer exploded in the office of a dentist at King's Mountain, N. C., and severely injured a young woman patient who had just entered the office.—Aug. 17 a man at Indianola, Ia., had a tooth extracted, refusing an anesthetic. Just as the work was completed he collapsed and it took considerable hard work on the part of the dentist and two physicians to resuscitate him.—Aug. 22 the vulcanizer exploded in the office of a dentist at Worcester, Mass., and severely burned his young woman assistant who was using it.—Aug. 25 the vulcanizer exploded in the office of D. B. Davis at Lafargeville, N. Y., and burned him severely.

MOLD FOR SEAMLESS CROWNS.—Homer Almon, in *Review.* After the model for the crown has been carved, mix plaster and set model in so that only the cusps are covered. Remove the model, cut a guide groove in the plaster, replace model and oil slightly. Now run plaster around one side, and when set trim it up and run the other side. This gives you a mold in three pieces, which has been found preferable for casting fusible metal. The gold may now be swaged by any of the methods, and after the swaging is completed boil in water to facilitate removal of the crown from the metal die.

FINGER-PRINTS OF TWINS.—It is said (*Brit. Dent. Jour.*) to have been demonstrated that in the human twins of the class who are of the same sex and closely alike (that is, those who suggest the theory of genesis by the first two blastomeres of ovi-sac fission) the marking on the skin of finger-tips are absolutely identical. However, in some of these cases the pattern is simply reversed, that is, as if the markings on a given finger-tip of one of the twins were made by taking an impression from the corresponding finger of the other. We mention this because we were reminded of the singular fact on lately seeing the models of the teeth of two sisters, which in several details of developmental irregularities were precisely the reversed counterpart of each other. For instance, the left superior lateral incisor of one and the right of the other were of the not uncommon stunted conical form. We were not able

to ascertain whether the sisters were twins, but the exactitude of the reversal and copy was very remarkable if only a coincidence.

REMOVE THE CAUSE.—The cause of undue response to thermal shock in a tooth pulp, or sensitiveness of dentin to touch, is a loss of a part of the protective covering. The indication is to restore the covering; the restoration should be made with a substance as nearly resembling tooth-structure as possible. Experiment has demonstrated that of the available materials cement most nearly fulfils the requirements and most nearly restores normal conditions. Lining the cavity with resin varnish will overcome the irritant effects upon the dentin.—F. C. WORTHLY, *Western.*

DAMAGE SUITS.—Sept. 4 a man at Kokomo, Ind., brought suit for $4,000 damages against a railroad company for the loss of two front teeth in an accident at one of its crossings.—Aug. 21 a young woman at Baltimore brought suit for $10,000 damages against a dentist of that city, alleging that by the improper use of instruments and drugs in attempting to fill her teeth he caused her to become seriously and permanently ill.—A woman at Milwaukee has sued a dentist for $1,000 damages, claiming that while extracting two decayed teeth he also pulled two sound ones.

NEW PROPERTY OF ALUMINIUM.—"A German investigator," says the *Scientific American,* "has discovered an exceedingly valuable and important property of aluminium, which consists in its application as a whetting agent, the effect produced on cutlery set with it being most astonishing. Though a metal, aluminium possesses the structure of a fine stone, has a strong dissolving power, and develops, upon use for honing, an exceedingly fine metal-setting substance of greasy feel, while showing great adhesion to steel. The knives, etc., treated with it quickly obtain such a fine, razor-like edge that even the best whetstone cannot produce a like result. Thus, knives which had been carefully set on a whetstone, when magnified a thousand times, still exhibited irregularities and roughness on the edge, while the edge of knives sharpened on aluminium, upon exactly the same magnification, appeared as a straight, smooth line."

SOLID FOOD DIET FOR CHILDREN.—It may be said the pap-feeding of children is the outcome of years of practical experience, and that it might be a fatal or dangerous experiment to venture upon a new method of feeding. All possible theories may be advanced against feeding children with food which demands much mastication, but the system has already been put to the test over and over again. In many cases it has been carried out more or less by chance, or by force of circumstances, but recently it has been put into deliberate practice in several parts of the kingdom, and from all I hear, with the most excellent results. I know of one child, who after he was weaned was seldom given any food which did not require a very considerable amount of mastication, and before he was three years old he sat down to his Christmas dinner, and had a liberal supply of turkey, boiled ham, greens, and potatoes, two helpings of plum pudding, some nuts, and an apple. He was not in the slightest way upset, and was happy to go through the same meal on the

following day, except that the turkey was cold. Needless to say, his teeth do not show the slightest signs of decay, although nowadays at the age he now is it is usual to find decay more or less advanced in several teeth.—J. SIM WALLACE, *Brit. Dent. Jour.*

ROBBERIES.—J. E. Combs and A. T. Lockwood, Visalia, Cal., Aug. 26, $75.—N. G. Mills, Connersville, Ind., Aug. 28, $35.—J. W. Brinnacombe and W. H. Gregg, Marion, Ind., Aug. 25, $10 each.—G. A. Foster, New Albany, Ind., Aug. 27, $35.—Chas. McIlwain, Louisville, Ky., Aug. 27, $60.—Dr. McGoldrick, Cambridge, Mass., Aug. 6, $20.—A. J. Wildanger, Flint, Mich., Aug. 13, $150.—J. Burns, Hutchinson, Minn., Aug. 30, $37; Drs. Allen and Nelson & Tifft lost $47 and $75 respectively in the same haul.—S. K. Billings, Omaha, Neb., Sept. 1, dental chair valued at $65.—H. E. Longnecker, Buffalo, N. Y., Aug. 16, $10.—E. L. Todd, Dunkirk, N. Y., Aug. 5, $25.—Dr. Davenport, Fargo, N. D., Aug. 19, $10.

HALL'S PHYSIOLOGY.—A Text-Book of Physiology, Normal and Pathological. For Students and Practitioners of Medicine. By WINFIELD S. HALL, Ph.D., M.D. (Leipzig), Professor of Physiology, Northwestern University Medical School, Chicago; Member of the American Physiological Society; Member of American Association for the Advancement of Science, etc., etc. New (2d) edition, revised and enlarged. In one octavo volume of 795 pages, with 339 engravings and three full-page colored plates. Cloth, $4.00, *net.* Lea Brothers & Co., Publishers, Philadelphia and New York, 1905.

PREPARING AN IMPRESSION TRAY FOR PLASTER.—F. W. Stephan, in *Review.* To prevent the plaster from flowing down the patient's throat when taking an impression, puncture the impression tray near the heel, making several holes about a quarter of an inch in diameter. Build up the heel with wax to reach the palate, and from this carry a piece of sheet wax forward under the tray. When taking the impression the surplus plaster will be forced through the holes and carried forward by the sheet of wax under the tray, thus effectually protecting the throat. The same result may be attained by cutting a V-shaped piece from the rear of the tray and building with wax.

HEINE'S HOMEOPATHIC JOKE.—Ughetti's work, "With Physicians and Clients," contains an anecdote about Heine which is not yet worn threadbare. Returning from a journey to the south of France, Heine met a friend in Lyons, who gave him a large sausage that had been made in Lyons, with the request to deliver it to a mutual acquaintance, a homeopathic physician in Paris. Heine promised to attend to the commission and entrusted the delicacy to the care of his wife. But as the post-chaise was very slow and he soon became ravenously hungry, on the advice of his wife both tasted of the sausage, which dwindled with every mile. Arriving at Paris, Heine did not dare to send the remainder to the physician, and yet he wished to keep his promise. So he cut off the thinnest possible slice, wrapped it in a sheet of paper, and enclosed it in an envelope with the following note: "DEAR DOCTOR.—From your scientific investigations we learn that the millionth part of certain substance brings about the greatest results. I beg,

therefore, your kind acceptance of the accompanying millionth part of a Lyons sausage, which our friend gave me to deliver to you. If homeopathy is a truth, then this little piece will have the same effect on you as the whole sausage. Yours, HEINRICH HEINE."

REPAIRING A MATRIX FOR AN INLAY.—C. J. Hadley, in *Review.* No matter how careful one is in burnishing a matrix in a deep cavity it can seldom be done without tearing the matrix at the bottom. I burnish the matrix in the cavity carefully, regardless of the tearing at the bottom, and then take a pellet of gold, unfold and cut out a piece that will cover the bottom of the cavity, and press it to place in the cavity, using firm pressure, after which I burnish it around evenly and then press in a little wax. The matrix can then be removed and the wax burned out in the furnace. This makes a matrix complete and there is no danger of the porcelain running through and causing a misfit.

ACTINOMYCOSIS.—When a patient presents with a sinus leading down to a patch of bare bone in the lower jaw, with a history that it has persisted for some time, in spite of removal of the tooth supposed to be the cause of the trouble, and that throughout the whole course of his ailment—and to this point the greatest importance should be attached—there has been little or no pain, I generally begin to suspect that a streptothrix of some sort may be the cause, although the confirmation of the diagnosis may be a matter of some difficulty and only obtained after repeated examinations of what little discharge there may be from the sinus.—THOS. H. KELLOCK, *Brit. Jour. Den. Sc.*

TRAINING SCHOOL YELL.—The *Capital* of Topeka, Kan., prints the following as the yell of the class of '94 at the Wichita Training School for Nurses:

Staphylococcus, streptococcus,
Microbes all!
Sterilize and fumigate,
Watch them crawl!
Big germs, little germs,
Short and tall;
Fat germs, lean germs,
We kill them all!
Antisepsis, that's our call,
We're the largest class of all!

DENTAL PARLOR BARKERS.—A correspondent of the Pittsburg *Leader* writes to that journal as follows, says the *Brief*: "Is there no way to induce the advertising dentists to desist from annoying pedestrians through the agency of their dusky 'wall flowers' who stand in front of these places of business and humiliate those who pass? These black pickets attired in the regulation garb of the organ grinder's monkey force upon the usually unwilling auditor all sorts of cards. Refusal to accept the bits of advertising matter usually induces the flunkey to drop his literature into the passer's basket or even to thrust it into a chatelaine. It is very common for these individuals to insult persons concerning their teeth. When my teeth

require attention I usually become painfully aware of that fact and it is not difficult to find a good dentist, but before I would allow one of these cheap darkies to dictate to me concerning my molars or drag me into one of these institutions, I would cheerfully submit my dental work to the most bungling amateur in the business even though I knew that he obtained most of his practice in a blacksmith shop."

THREATENED ABORTION FROM ERUPTION OF THE THIRD MOLARS.—Guerin-Valmale (*Montpellier Médical*). A woman, aged 27, had suffered two years before, in the course of her first pregnancy, from severe neuralgia, due to the eruption of the upper third molars. In the sixth month of her second pregnancy she was seized with severe headache with a temperature of 101.6°. Pain in the back, extending to the hypogastrium, accompanied by a slight discharge of blood from the vagina, quickly followed. Uterine contractions could be distinctly perceived, but the cervix was not altered. The condition was attributed to influenza, and she was given morphia and antipyrin. On the following day the headache was less, but there was some difficulty in swallowing. On the third day the lower third molars were observed perforating the gum. The symptoms then rapidly subsided.

TEETH AND INSURANCE.—The Administration of State Insurance of German workmen for sickness and old age is devoting increased attention to dentistry, says the *Brit. Jour. Dent. Sc.* It has discovered that defective teeth often have a very deleterious influence on general health, and, partly in its own interest, it has the teeth of large numbers of workmen properly attended to. The annual expense incurred in the Berlin district alone for dental treatment having risen to $25,000, the committee of the Berlin section of the State Insurance contemplates the establishment of a dental hospital of its own. This would not only effect a great saving, but would also enable the committee to exert more careful control over the execution of dental work and to watch the results with more accuracy. Germany is thus the first country to recognize the national importance of its workers having serviceable teeth. The example of Berlin will undoubtedly be followed in other great centers throughout the Empire.

TO ATTACH FACINGS WITHOUT REMOVAL OF PIECE FROM THE MOUTH.—Select tooth (plate or rubber), grind off the pins, cover the entire tooth with wax or paraffin, and press to place after having bent the pins of old facing to form a dovetail. Then remove and cut away wax between and including impression of pins in the backing, with fine pointed instrument or needle, being sure to have exposed portion of porcelain clean. Cut hole in wax smaller than impression would indicate, attach to platinum wire with wax, and suspend in hydrofluoric acid, by inserting end of wire in stopper of acid bottle. Look at it from time to time, allowing it to remain until the acid has eaten the porcelain to the depth of the platinum pins, then wash and remove wax and you will usually find an undercut hole. Should the hole not be sufficiently undercut, the writer has found copper disks and grit of aid in making undercuts in sides of hole. Cement to place, and if it comes off cuss the writer, whose only excuse for writing this article is the

fact that he would like to have others enjoy an easy way out of the old bugbear of broken facings. He has put on a number in this way in the last two years and a half, and so far none has come off, so he feels warranted in advising others to try it.—*H. A. Dillingham*, Sheboygan, Wis.

MARRIAGES.—Arthur Bauman, a dentist of New Castle, Pa., was married to Miss Frances Huffman of Bluffs, Ill., Aug. 7.—Edward C. Briggs, a dentist of Boston, Mass., was married to Miss Ethel McClure of Kittery Point, Me., July 26.—Edward T. Fox, a dentist of Clinton, Mass., was married to Miss Elizabeth Moran of West Boylston, Mass., Aug. 16.—Maurice A. Glaspey, a dentist of Bridgeton, N. J., was married to Miss Bertha K. Parker of Bridgeton Aug. 19.—George Howard Henry, a dentist of Hartford, Conn., was married to Miss Grace Winnifred Andrews of Elmwood Aug. 22.—Charles R. Knight, a dentist of Greenville, Mich., was married to Miss Bessie Hills of Ionia Aug. 7.—F. W. Murdock, a dentist of Manhattan, Kan., was married to Miss Bessie McClaran of Princeton, Mo., Aug. 12.—J. H. Nelson, a dentist of Lebo, Kan., was married to Miss Mattie Smith of Lebo Aug. 31.—H. M. A. Smith, a dentist of Knoxville, Tenn., was married to Miss Fannie Murphy of Knoxville Aug. 8.—William Stahl, a dentist in the Philippines, was married to Miss Katherine Gurrell of Chicago Aug. 30.—K. D. Park, a dentist of Painesville, O., was married to Miss Ella Boldt of Cleveland Aug. 16.—George B. Weakley, a dentist of Springfield, Ill., was married to Miss Helen E. Zugg of Jersey City, N. J., July 25.

LIABILITY OF DENTIST ADVISING AGAINST SEEING PHYSICIAN.—The Supreme Court of California, says (reports the *Jour. A. M. A.*), in Mernin vs. Cory, an action for malpractice against a dentist, that the jury was instructed as follows: "If you find from the evidence that defendant advised plaintiff not to consult a surgeon or secure medical treatment after her jaw was injured by defendant, if you find the same was carelessly and negligently injured by defendant, and that plaintiff relied thereon, and did not consult a physician or surgeon for a number of weeks after such injury, and that by reason of such delay plaintiff's injuries were aggravated and made worse, and that it was more difficult or impossible to treat or cure such injuries of plaintiff, and that thereby such injuries became and are permanent and can not be cured, and the same has affected the general health of plaintiff, and she has become and is sick and disordered and unable to work or perform labor, or support herself by her own labor and work as she did prior to such injuries, if you find that she did so work and support herself before she was injured by defendant—then I instruct you that you may take all such matters into consideration in fixing the damage incurred by plaintiff by such acts." It was contended that this instruction was erroneous, because it was not the duty of the defendant, being merely a dentist and not a general physician or surgeon, to give the kind of advice asked by the plaintiff, but the Supreme Court does not think that this contention was maintainable. It says that while a dentist may be qualified for his profession without being learned in the general science of therapeutics, he certainly should have such knowledge of the very bone out of which he extracts a tooth as to enable him to under-

stand whether it has been so injured as to require treatment beyond his skill. As to the contention that the instruction was erroneous because it did not expressly state that the advice was carelessly or unskillfully given, the court says that other instructions that were given clearly informed the jury that carelessness or unskillfulness must have attended all the alleged acts of the defendant in order to make him liable, and there was no necessity of repeating them at every part of the instructions. Moreover, if the facts stated showed malpractice, the use of adjectives or adverbs to expressly characterize such malpractice as careless or unskillful would add nothing to the statement. After the alleged acts of malpractice the plaintiff had a "popping" or "clicking" of the jaw—a disagreeable sound made by a movement of the jaw. The defendant offered to call several witnesses to testify that each of them had a clicking jaw. The court does not think it was in error to sustain an objection to the proposed testimony.

FATALITIES.—Aug. 25 a woman, 58 years old, died in a dentist's office in Keosauqua, Ia., after having five teeth extracted. Physicians who were called in stated that her death was due to Bright's disease, which was aggravated by the shock of the operation.—Sept. 2 a woman died in a dentist's chair at Rochester, N. Y., after having four teeth extracted. It was intended to remove fourteen teeth, but her condition became alarming before the work could be completed. Her physician was present and administered the anesthetic—ether.—Sept. 1 a man at Upper Sandusky, O., died after the extraction of one tooth. It had been aching for some days and his face was so swollen that he could not open his mouth, so some difficulty was experienced in removing the tooth.—Aug. 26 a young girl at McKeesport, Pa., while delirious from pain caused by neuralgia, managed to pull out several of her teeth, and died within a few hours from shock and loss of blood.—Aug 8 a woman at Philadelphia, 26 years old, died from blood-poisoning which followed the extraction of a tooth a few days previous.—Aug. 4 a woman at Altoona, Pa., 22 years old, went to a dentist to have an aching tooth extracted. He had scarcely looked at the tooth when she collapsed and died almost immediately. A physician who was called assigned nervous prostration, complicated by great fear, as the cause of her death.

SOFT FOOD A SOURCE OF CARIES—ADENOIDS A DIETETIC DISEASE.—"Mr. J. G. Turner [British Royal Institute of Public Health] called attention (says the *Medical Record*) to the fact that soft food was a fruitful source of caries in young children, starch and sugar, which undergo acid fermentation, being specially harmful and preparing the way for bacterial attacks on the dentin. He advocated hard food as a preventive of caries, insuring mechanical cleansing of some parts and flushing of others by saliva. At the same meeting Dr. Harry Campbell read a paper on the same subject. He dwelt upon the great importance of giving children their starchy food in a form compelling adequate mastication. He drew attention to the fact that not only were digestive disturbances occasioned by soft food, but the maxillary apparatus not being exercised adequately did not develop properly, neither did the nasal passages nor the nasopharynx. The teeth were apt to be irregular and to

decay early, and the child became the victim of adenoids. That the latter was a dietetic disease the speaker had no doubt. Dr. Campbell advised that hard, solid foods should be given at the age of seven months, when the infant should be allowed to gnaw at chop bones and chicken bones and to eat hard, leathery crusts, biscuits, sugar-cane, and certain fruits. In this way the child learned to masticate by instinct, and not until then should a limited quantity of the softer farinaceous foods be permitted. Throughout childhood the bulk of the starchy foods should be in a form which would compel mastication, since that not only favored the development of the nasal passages and nasopharynx, but further insured buccal digestion."

TEETH A CAUSE OF GENERAL PATHOLOGICAL CONDITIONS.—A child twenty-two months old was sick ten days, says Kate W. Baldwin in *Brief*. It was restless and fretful, with temperature rising irregularly, from 101° to 104° F. As a cause almost every possible thing had been considered—typhoid fever, malaria, etc. At last the child's movements drew attention to the ears, and mastoiditis was suggested. I was asked to see the little one and went over the case very carefully from several standpoints. I found no tenderness over the mastoids, no discharge from the ears, but the drum membranes were reddened and slightly bulging—would probably have ruptured within forty-eight hours. On inspecting the mouth the cause of all the trouble was quite apparent. The points of four cuspids were just barely through, and four molars were well advanced. As the father and mother were both physicians, and as in a similar case to which I had been called in consultation a few weeks previously I had been told by the attending physician that such symptoms could not be caused by difficult dentition, I hesitated to say that in my opinion the teeth were the cause of all the trouble. So thoroughly convinced was I, however, that I gave voice to the opinion, and suggested a thorough lancing of all the gums, and giving a free laxative, and bromid and gelsemium to quiet the nervous system. There was no nonsense about those parents, and they insisted upon immediate action. About a week later I learned by telephone that the child was all right, it having at once begun to improve. Some months later the mother thanked me very cordially for my diagnosis and treatment. She informed me that teeth were playing a very important part in her diagnosis in pathological conditions of children.

NUMBER OF GRADUATES.—The following is a list of the graduates from each of the dental colleges in the United States for the session of 1904 and 1905.—*Register.*

Name of College.	Number Graduates.
Baltimore College of Dental Surgery	79
University of Maryland	76
Baltimore Medical College	31
Pennsylvania College of Dental Surgery	98
Philadelphia Dental College	113
University of Pennsylvania	165
Medico-Chirurgical College	15
New York College of Dental Surgery	104

New York College of Dental and Oral Surgery	54
University of Buffalo	74
Harvard University	30
Tufts College	26
George Washington University	23
Georgetown University	5
Howard University	9
Medical College of Virginia	6
University College of Medicine, Richmond	18
Southern Dental College	40
Atlanta Dental College	81
University of Tennessee	37
Vanderbilt University	36
Mahary Dental College	13
Birmingham Dental College	11
New Orleans College of Dental Surgery	31
Ohio College of Dental Surgery	77
Cincinnati College of Dental Surgery	22
Ohio Medical University	56
Western Reserve University	30
Pittsburg Dental College	61
University of Michigan	34
Detroit College of Medicine	15
Indiana Dental College	71
Louisville Dental College	105
Chicago Dental College	168
Northwestern University	207
University of Illinois	69
Milwaukee Medical College	28
Milwaukee College of Physicians and Surgery	6
University of Minnesota	48
University of Iowa	16
Keokuk Dental College	18
St. Louis Dental College	67
Washington University	59
Barnes Dental College	7
Kansas City Dental College	48
Western Dental College	57
Omaha Dental College	33
Lincoln Dental College	6
Colorado Dental College	17
North Pacific Dental College	41
University of California	40
College of Physicians and Surgeons	36
University of Southern California	20
Total	2,627